COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES RESTRICTED
HR02227827

LIBRARY

Columbia University
in the City of New York

College of Physicians and Surgeons

Library

HACKH,

Penn Dept of Health
Report

Digitized by the Internet Archive
in 2010 with funding from
Columbia University Libraries

http://www.archive.org/details/annualreportofco19102penn

Rec'd 3/15/15
Dck, apl-1915.-

THE FIFTH ANNUAL REPORT

OF THE

Commissioner of Health

OF THE

COMMONWEALTH OF PENNSYLVANIA

1910

PART II

The Telegraph Printing Co.
Harrisburg, Pa.

Pa

LIBRARY
COLLEGE OF
PHYSICIANS AND SURGEONS
SAN FRANCISCO
CALIF.
SCHOOL OF DENTISTRY

002279

APR 23 '34

47-38289B

(892)

TABLE OF CONTENTS

PART II

Page

Report of the Division of Sanitary Engineering, ... 895
  Organization and Administration, ... 897
  Office Work, ... 903
  Engineering, ... 909
    Table of Water Works Permits and Decrees (1905-1910), ... 918
    Table of Sewerage Permits and Decrees (1905-1910), ... 943
    Table of Purification Plants for Public Water Supplies and their operation, ... 995
  Field Inspection, ... 1007
  Epidemics, ... 1019
    Outbreak of Dysentery at Chester, ... 1019
    Outbreaks of Typhoid Fever at:
    Brookville, ... 1023
    Titusville, ... 1032
    South Fork, ... 1034
    Scottdale, ... 1052
    Dillsburg, ... 1071
    Cokeburg, ... 1077
    Wyoming Valley (Wilkes-Barre, etc.), ... 1080
    Nescopeck, ... 1223
    Texas Township (suburb of Honesdale), ... 1240
    Pennsylvania Industrial Reformatory (Huntingdon), ... 1249
    Lime Ridge, ... 1268
    Mt. Joy, ... 1278
    Avella, ... 1285
    Glen Rock, ... 1287
    Byrensville, ... 1313
    Coraopolis, ... 1316
    Woodland, ... 1321
    Connellsville, ... 1329
    Falls Creek, ... 1342
    Carmichaels (*i. e.* Inspection of Cumberland and Jefferson Townships, Greene County), ... 1351
    Quarryville, ... 1354
  References to Special Counsel, ... 1369
  Conclusions, ... 1375
Report of the Division of Supplies, ... 1377
Report of the Division of Accounting and Purchasing, ... 1379

VIRTUE
LIBERTY AND
INDEPENDENCE

THE DIVISION OF SANITARY ENGINEERING

F. HERBERT SNOW, C. E., Chief Engineer

(896)

DIVISION OF ENGINEERING

The following is a detailed statement of the operation of the Engineering Division of the State Department of Health to the end of the year 1910, being the Fifth Annual Report of the Division made since the creation of the Department of Health:

I. ORGANIZATION AND ADMINISTRATION

1. OFFICE AND OFFICE FORCE.

Mr. F. Herbert Snow has continued throughout the year to discharge the duties of his position as Chief of the Engineering Division of this Department.

The offices of the Division are on the ground floor front, and entresol floor, north corridor, and on the fifth floor, south corridor, of the Capitol.

Six sub-divisions of the organization have been created in the administration of the work put upon the office, namely: That of general office work; that pretaining to water works and sewerage applications; that relating to special investigations; that relating to design and construction; that of map making, and finally, that of sanitary regulation.

There have been employed in the office ten stenographers and ten clerks.

2. ASSISTANT ENGINEERS

Mr. Paul Hooker has acted as Principal Assistant Engineer in charge of water works and sewerage investigations, and continued, during the first four months of the year, to devote considerable time to a special study and report on sewerage and water supply conditions in the Allegheny Basin.

Mr. Thomas Fleming, Jr., Principal Assistant Engineer in charge of Designs and Construction, continued in charge of the Design and Construction section until the time of his resignation on September 1st, 1910. During those months he had general supervision over the work done by the Department at Mont Alto, Cresson, Hamburg, Polk and Wernersville and also had supervision over the map making in the Department. Mr. Fleming also wrote reports for the Engineering Division of the sewage disposal plant for the State Hospital for the Insane at Danville, the sewage disposal plant at Pitcairn borough, Clymer borough sewerage. Neversink Mountain Tuberculosis Sanatorium sewerage, and the Cresson borough water supply. He made an inspection of the borough of Parkesburg and an inspection of the sewage disposal plant of the City of Baltimore, Md. He also made a study of the West Chester water supply and an examination of the plans for the proposed filters for that borough.

Mr. Charles A. Emerson, Jr., Principal Assistant Engineer in charge of Design and Construction, was appointed to fill the vacancy caused by Mr. Fleming's resignation on September 1st, 1910, and on that day took over all the duties which Mr. Fleming had exercised in connection with the Mont Alto, Cresson and Hamburg sanatoria, as well as the work being done at the State Institution for Feeble Minded of Western Pennsylvania at Polk, and the State Asylum for the Chronic Insane at Wernersville. Mr. Emerson also did the following special work for the Engineering Division: A study and report of the plans of the Harrisburg sewerage system, inspection and report of the sewage disposal plant at the Western Pennsylvania Hospital for the Insane at Dixmont, Allegheny County, and an inspection, survey and report on the sewage disposal plant of the Devon Drainage Association, Easttown Township, Chester County. During this year he also conducted a series of tests at the pumping plant of the Moreland Spring Water Company near Jenkintown and superintended the survey in the borough of Steelton, to relieve nuisances along Mohn Street in the borough and in Swatara Township.

Mr. Walter S. Hanna continued as Principal Assistant Engineer in charge of general office work until September 1st, when he resigned.

Mr. C. Howe Cummings continued as Principal Assistant Engineer in charge of special engineering investigation until September 1st, when he was appointed to the position made vacant by Mr. Hanna's resignation. Mr. Horace P. Rees continued throughout the year to assist Mr. Hanna and Mr. Cummings in the discharge of their duties. In addition Mr. Rees made several minor field investigations of water works and sewerage systems.

Mr. Ralph E. Irwin has acted as Principal Assistant Engineer in charge of tests of water purification and sewage treatment plants and has also made engineering investigations having special bacteriological features.

Mr. William H. Ennis, Mr. Howard E. Moses and Mr. William C. Riddle have continued as Assistant Engineers on investigations of water works and sewerage systems.

Mr. John M. Mahon, Jr., Assistant Engineer, devoted the greater part of the year to general office work in connection with the surveys, estimates and construction work at the Pennsylvania State South Mountain Sanatorium at Mont Alto, and the State Sanatorium for Tuberculosis near Cresson. He also made the computations of the property survey at the proposed State Sanatorium near Hamburg and did miscellaneous office work in connection with the contracts for sewage disposal plants and sewers at the State Institution for Feeble Minded of Western Pennsylvania at Polk and the State Asylum for Chronic Insane near Wernersville. He assisted Mr. Emerson in his study of the plans of the Harrisburg sewerage system. He also made a study and geologic chart of the State in connection with the epidemic of acute anterior polyomyelitis for the Medical Division. Between November 28th and December 3rd, Mr. Mahon was in charge, under Mr. Emerson's direction, of the survey of the sewage disposal plant of the Devon Drainage Association and vicinity. Between November 21st and 23rd, and December 12th and 15th, he assisted Mr. Emerson in the series of tests of the pumping plants of the Moreland Spring Water Company in the vicinity of Jenkintown.

Mr. Abner H. Beard, Assistant Engineer, devoted the principl part of his time during 1910, to the work at the Pennsylvania Sanatorium for Tuberculosis near Cresson. Between February 1st and 20th, he was in charge of the construction of the sewage disposal plant at the State Institution of Feeble Minded of Western Pennsylvania, at Polk. From February 20th, until April 1st, he devoted his time to miscellaneous work on the Polk and Wernersville contracts at the Harrisburg office. On April 1st, 2nd, 5th, 8th and 9th, he was on the property survey of the proposed State Sanatorium near Hamburg, while between May 22nd and 25th he again took charge of the construction work at Polk.

Mr. Charles R. Forbes, Assistant Engineer, spent the entire year in charge of contract and construction work at the Pennsylvania State South Mountain Sanatorium for Tuberculosis at Mont Alto.

Mr. Frank L. Gardner, Assistant Engineer, spent time between January 1st, and February 10th, at Cresson as topographical draftsman on the property survey. The time between February 10th and March 26th, he spent on the construction work at Mont Alto assisting Mr. Forbes, and from March 28th until April 12th, was an instrument man on the Hamburg property survey. He was employed on miscellaneous office work on the various contracts of this Department between April 12th and May 31st, when he resigned.

Mr. Harry A. Otto, Assistant Engineer, was employed during the entire year as an engineering draftsman on the various contracts under the supervision of this Department at Mont Alto, Polk and Wernersville and was also employed in plotting the results of the property survey at Cresson.

Mr. John E. Perry, Assistant Engineer, devoted his time between January 1st and February 26th, on the Cresson property in charge of the surveying corps. On February 27th and 28th, he was in Harrisburg office on work on the estimate for the Polk sewage disposal plant. He resigned on February 28th.

Mr. Coleman B. Mark, Assistant Engineer, was occupied between January 1st and March 18th, on the sewage disposal plant contract at Polk. From March 19th to April 17th, he was employed on work at the State Sanatorium near Cresson after which time and until August 1st, he returned to the construction work on the sewage disposal plant at Polk. From August 1st, until

August 26th, he was again employed on work at the Cresson Sanatorium after which he was at Hamburg in charge of a party employed on the property survey for the proposed new sanatorium. From September 12th until December 4th, Mr. Mark returned to work at the Cresson Sanatorium. On December 5th, he returned to the Harrisburg Office, devoting his time to miscellaneous office work until the end of the year with the exception of the time between December 12th and 16th, when he assisted Mr. Emerson in tests of the Moreland Spring Water Company near Jenkintown.

Mr. Moylan E. Shaughnessy, Assistant Engineer, has been engaged in making water works and sewerage investigations and also special sanitary investigations.

3. ENGINEERING ASSISTANTS.

Under Mr. Irwin, Messrs. Max Matthes, Roland B. Styer, Fred Fletcher and John B. Baumgardner have been engaged in making tests of water purification and sewage disposal plants and in other work of an allied nature, especially in collecting water samples for analysis. Mr. Baumgardner resigned on June 7th, and Mr. Fletcher on June 11th.

Mr. James L. W. Gibbs, continued as draftsman in charge of map making throughout the year under the immediate direction of Mr. Emerson. The following men have worked under Mr. Gibbs in making and tracing maps, when not occupied in the survey and construction work carried on by the section: G. Douglas Andrews, Chester A. Eckbert, Ivan M. Glace, John W. German, Jr., C. Richard Krall, Coleman B. Mark, Ira L. Miller, F. Marion Sourbeer and George Williams. Mr. Williams also did work on the Department's tuberculosis exhibit.

The topographical survey of the Carnegie Tract at Cresson was completed under the direction of Mr. Beard by Frank L. Gardner, topographic draftsman; John E. Perry, Ivan M. Glace, and Chester A. Eckbert, instrument men; Ira L. Miller, rodman; Joseph A. Flanagan, note-keeper. Messrs. Glace and Eckbert acted as levelmen when necessary.

Mr. G. Douglas Andrews as a rodman spent March 29th, 30th and 31st on on the property survey at Hamburg, September 23rd to 30th on the construction work at Mont Alto, and from November 26th to December 3rd, on the survey of the Devon Drainage Association in the capacity of rodman.

Mr. Chester A. Eckbert spent the time as instrument man between January 1st and February 15th, on the property survey at Cresson and between June 5th and September 12th, on construction work for the Cresson Sanatorium. Between September 17th and October 10th, he was employed on construction work at the Mont Alto Sanatorium and between November 26th and December 3rd, was rodman on the survey of the Devon Drainage Association property.

Mr. Ivan M. Glace was employed as levelman on the property survey at Cresson between January 1st and February 24th and also between March 21st and 28th. On March 29th, he began the Hamburg property survey as an instrument man where he continued until May 31st, with the exception of the days between May 9th and 21st, when he was employed on the construction work at Mont Alto. On August 31st, he returned to Hamburg and was employed in setting the property corners on the State's land at that place until October 4th. Between November 28th and December 3rd, on the survey of the Devon Drainage Association property as instrument man.

Mr. C. Richard Krall was a rodman on the Hamburg property survey between March 29th and May 31st, and was employed on construction work at Mont Alto between July 1st and December 23rd, as inspector.

Mr. Ira L. Miller spent his time on the Cresson property survey as rodman between January 1st and February 24th and March 21st and 27th. Between March 28th and April 30th, his time was spent on the Hamburg property survey and on October 13th and 14th; on the survey in Steelton as rodman.

Mr. George E. Williams devoted his time between tracing for the Design and Construction Section and map making for the Engineering Division except between May 23rd and 29th, when he was with the traveling tuberculosis exhibit of the Department.

Mr. Joseph Flanagan was employed as time-keeper and inspector on the work for the State Sanatorium for Tuberculosis near Cresson between January 1st and July 31st. He resigned from the Department on July 31st.

4. SANITARY INSPECTORS.

Mr. Moses K. Ely has continued as the Chief Sanitary Inspector in charge of the Sanitary Inspection Section and having supervision of the work of all Field Inspectors.

Besides the sanitary inspectors in the employment of the Department at the beginning of the year, four new sanitary inspectors have been appointed by the Commissioner of Health. The name, place of residence and date of appointment of each are given below:

John Henry Laughlin, March 1st, 1910, Philadelphia.
James B. Aurand, May 20th, 1910, Lewistown.
James H. Stewart, June 8th, 1910, Philadephia.
Joseph M. Hellings, January 3rd, 1910, Philadelphia.

Deputy Field Officers, so called, because while being in the employ of a private corporation, they are deputized to represent the Commissioner of Health in inspecting the sanitary condition of property and to report results to him, where appointed in ten instances prior to 1910. During the current year two additional appointments were made. The name, residence of each and date of appointment are given below:

H. N. Blunt, Palmerton, June, 1906.
L. E. Agnew, Alderson, Harvey's Lake, June, 1906.
Wm. C. Edmunds, Nanticoke, June, 1906.
Howard Seabold, Catasauqua, November, 1906.
E. M. Stack, Scranton, April, 1908.
John Brown, Scranton, April, 1908.
Emil Amann, Warren, May, 1908.
David Becker, Ridgway, June, 1908.
Scott Bailey, DuBois, May, 1909.
F. D. Eagle, Butler, March, 1909.
D. M. Watt, Butler, March, 1909.
John Coslett, Scranton, May, 1910.

5. REGULAR FORCE.

On December 31st, 1910, the regularly employed force in the Engineering Division consisted of 10 clerks, 10 stenographers, 14 assistant engineers, 2 engineering assistants, 9 draftsmen and 60 sanitary inspectors. The names given alphabetically will be found elswhere in the report of the Commissioner of Health, and as follows:

Assistant Engineers

Abner, H. Beard, Designs and Construction.
C. Howe Cummings, Principal Assistant in Charge General Office Work.
C. A. Emerson, Jr., Principal Assistant in Charge of Designs and Construction.
William H. Ennis, Principal Assistant in Charge of Special Investigations.
Charles R. Forbes, Designs and Construction.
Paul Hooker, Principal Assistant in Charge of Water Works and Sewerage Investigations.
Ralph E. Irwin, Principal Assistant in Charge of Water and Sewage Purification Testing.
John M. Mahon, Jr., Designs and Construction.
Howard E. Moses, Water Works and Sewerage Investigations.
Harry A. Otto, Designs and Construction.
Horace P. Rees, General Office Work.
William C. Riddle, Water Works and Sewerage Investigations.
Moylan E. Shaughnessy, General Investigations.
Coleman B. Mark, Designs and Construction.

Engineering Assistants

Max Matthes, Water Sampling and Testing.
Roland B. Styer, Water Sampling and Testing.

Draftsmen

G. Douglas Andrews.
Chester A. Eckbert.
John W. German, Jr.
James L. W. Gibbs, Chief Draftsman.
Ivan M. Glace.
C. Richard Krall.
Ira L. Miller.
F. Marion Sourbeer
George Williams.

Clerks

Bohl, Andrew J., Clerk of Sanitary Inspection Work.
Einstein, Richard F., Clerk of Sanitary Inspection Work.
Haines, Howard H., Clerk of Sanitary Inspection Work.
Ness, Daniel V., Chief Clerk in Charge Nuisance Complaints.
Pretty, Nellie S., Clerk Plan Files.
Ritter, Wilson W., Clerk of Water Sampling and Testing Work.
Rourke, Edith, Clerk of Sanitary Inspection Work.
Styer, R. K., Clerk (Multigraph Work).
Trace, Lila Hamill, Clerk of Correspondence Files.
Warlow, Warren F., Clerk General Office Work.

Stenographers

Cuenot, M. Irene.
Eckels, M. Louise.
Fleisher, Elizabeth R.
Gilbert, Jane.
Hannah, Leola R.
Hurst, M. Ethel.
Mahaney, Clara V.
Moore, Anna E.
Russell, Mary E.
Sourbeer, Mary K.

Sanitary Inspectors

Andrews, Henry, Field Officer.
Aurand, James B., Field Officer.
Beckley, Harry C., Field Officer.
Carson, W. G., Field Officer.
Clark, James M., Field Officer in Charge.
Claypoole, William R., Field Officer.
Collins, Charles W., Field Officer.
Conrad, Andrew W., Field Officer.
Considine, John J., Field Officer in Charge.
Couch, Joseph S., Field Officer.
Courtney, R M., Field Officer.
Dale, Jesse E., Field Officer in Charge.
Eisenhart, John W., Field Officer.
Ellis, William, Field Officer.
Ely, Moses K., Chief Sanitary Inspector.
Engle, Simon B., Field Officer.
Evans, Edward H., Field Officer.
Frederick, Morris Z., Field Officer.
Haldeman, L. S., Field Officer.
Hansbury, Robt. S., Field Officer.
Hellings, Joseph M., Field Officer.
Hood, Warren S., Field Officer in Charge.
Imler, Lincoln S., Field Officer.
Irwin, D. M., Field Officer.
Jarrett, Charles P., Field Officer.
Kauffman, Harry S., Special Field Officer.
Kauffman, William H., Field Officer.
Lanard, Frank H., Field Officer.
Laughlin, John Henry, Field Officer.

Maclay, Charles T., Field Officer.
Magee, Harry E., Field Officer.
Marshall, D. J., Field Officer.
McCleary, J. A., Field Officer.
Miller, Harry A., Field Officer in Charge.
Miller, John K., Field Officer.
Moore, Howard B., Field Officer in Charge.
Morris, William H., Field Officer.
Nickel, Otto F., Field Officer.
Nicholson, Thomas P., Field Officer.
Nightingale, John B., Field Officer in Charge.
Oates, John J., Field Officer.
Pierce, Lester L., Field Officer.
Pinkham, John W., Field Officer in Charge.
Reno, W. W., Field Officer.
Rice, W. E., Field Officer.
Roebuck, Joseph W., Field Officer.
Silliman, J. H., Field Officer.
Slagle, I. H., Field Officer.
Spelker, Charles H., Field Officer.
Souder, Roy M., Field Officer in Charge.
Stewart, James H., Field Officer.
Teats, William R., Field Officer in Charge.
Templeton, Thos. W., Field Officer in Charge.
Thompson, I. D., Field Officer.
Tiffany, L. E., Field Officer.
Vare, R. L., Field Officer.
Wanbaugh, William C., Field Officer.
Whelan, Timothy, Field Officer.
Zellers, Daniel M., Special Field Officer.
Zeigler, Ira F., Special Field Officer.

Mr. E. T. Edward, City Health Officer for Johnstown, has continued to represent the Department as a special sanitary inspector in the immediate territory beyond the jurisdiction of that city.

6 LOCAL HEALTH OFFICERS.

To better administer the work of the Department throughout the 1,500 and over second class townships of the Commonwealth, wherein reside over two and a third million of people entirely without sanitary protection such as is afforded by the Boards of Health of first class townships and the boroughs of Pennsylvania, the Commissioner of Health in the year 1907 had the State—66 counties excluding Philadelphia—divided into sanitary districts totalling 733 for each of which he appointed a resident agent.

In this division, so far as possible and practicable, townships boundaries were followed. Usually a district comprises two or more townships, including the boroughs and cities therein. For instance, Logan township, Blair County, including with it Altoona city and Juniata borough, comprises a district. The City of Pittsburgh proper is a district by itself.

The resident sanitary agent of the Commissioner of Health, in so far as his duties relate to the Medical Division of the Department, is confined to the territory wholly without the borough, city and first class township because these municipalities are required by law to have their own organized boards of health, but everywhere within this district regardless of the municipal boundaries, the resident sanitary agent is expected to investigate stream pollutions. water works and sewers, to render assistance to field officers and to report to the chief of the Engineering Division.

The work performed for the Engineering Division of the Department appears elsewhere herein.

II. OFFICE WORK

The general office work necessary to administer the operations of the Division, including general correspondence, recording corporation reports and plans required by law to be filed in the office of the Department or in compliance with decrees of the Commissioner, attention to petitions and complaints, the issuing of orders for the abatement of nuisances and menaces, and the preparation of plans of watersheds for the use of sanitary inspectors in the field, comprises the subjects treated of in this part of the report under the head of office work. More or less office work is performed in connection with the sub-divisions of the organizations and it is mentioned elsewhere.

7. CORPORATION REPORTS.

Under provisions of Law No. 182 of the Acts of the Assembly of Pennsylvania, approved April 22nd, 1905, entitled "An act to Preserve the Purity of the Waters of the State, for the Protection of the Public Health," it is the duty of every municipal corporation, private corporation, company and individual supplying or authorized to supply water to the public within the State to file with the Commissioner of Health a certified copy of the plans and surveys of the water works, with a description of the source from which the supply of water is derived.

Under the provisions of the same law, it is the duty of the public authorities having by law charge of the sewer system of every municipality in the State to file with the Commissioner of Health a report of such a sewer system which shall comprise such facts and information as the Commissioner of Health may require.

Sixty-three reports were received. Ten of them were from municipal corporations and fifty-three were from private corporations.

The municipal returns comprised three water supply reports and seven sewerage reports.

The private corporation reports pertained to fifty-three water works systems.

The Department has now on file information obtained in this formal way relative to water supply in eight hundred and sixty-seven places and relative to sewerage in four hundred and fifty places.

These are the initial reports submitted with respect to water works and sewerage systems in operation at the time of the creation of the Department and are exclusive of the reports submitted with applications for permits from the Commissioner of Health, which permits must be obtained before old systems can be legally extended or new ones installed. These applications are mentioned elsewhere in this report.

8. RECORDED PLANS.

On December 31st, 1910, there were 9,218 plans officially registered in the Department, 1,578 having been added during the year; and of the grand total 3,886 accompanied water works and sewerage reports, of which 517 were added during the year, 3,439 accompanied water works and sewerage applications, of which 520 were added during the year and 1,883 were of miscellaneous character, including some of the office working maps and those used in field engineering and inspection work, of which 541 were added during the year.

9. PETITIONS AND COMPLAINTS.

The Commissioner of Health, in addition, to the powers conferred by the new law, has all the powers conferred and must perform all the duties heretofore imposed by law upon the former State Board of Health, or any member, committee, or officer thereof, including the Secretary. The work of supervising the general interests of the health and lives of the citizens of the Commonwealth has been done in part in answer to petitions and complaints and requests for advice. The Commissioner's instructions to give prompt attention to petitions, complaints and requests have been complied with in so far as the Department's force made it possible.

Hundred of communications relative to stream pollutions by sewage or by industrial waste, or with respect to unsanitary conditions, inferior water supply or ice supply and respecting sewers, sewage disposal, water supply and general sanitation have received attention.

Five hundred and sixty-six complaints and petitions have been acted upon during the year. Five hundred and fifty of these cases have been satisfactorily settled.

Twenty-seven requests for advice relative to sewage, waste water and garbage disposal and to the location and construction of cess-pools, slaughter houses and pig-pens have been answered.

Common nuisances located with the territory of municipalities having organized boards of health and made the subjects of complaints to the Commissioner of Health, have been referred by the Department to such local boards. There have been two hundred and eighteen references of this kind during the year as follows, and at the close of the year all but eight of these cases have been reported by the various boards of health as being abated:

Stream Pollution: Ambler, Arnold, Bangor, Berwick, Bridesburg, Conneautville, Ballas, East Berlin, Houtzdale, Huntingdon, Indiana (2), Irwin, Jeannette, Lebanon, Philadelphia, Portage, Ridgway, Selinsgrove (19).

Sewage in Street Gutter: Catasauqua, Chester, Collingdale, East Mauch Chunk (2), Eldred, Heidelberg, Hollidaysburg, Hummelstown, Leechburg, Media, Mercerburg (2), Middletown, New Bethlehem, North Wales, North York, Pittston (2), Pottstown, Rockledge, Salisbury, Secane, Shenandoah, Upper Darby Township, Delaware County (2), Wilmerding, Wilmore (28).

Sewer Outlets: Waterford (1).

Defective Sewers: Altoona, Applewold, Callery, Carlisle, Montgomery, Mt. Union, Pitcairn, Pottstown, Shenandoah, Swissvale, York (11).

Open Sewers: Avalon (2), Bellevue, Finleyville, Tamaqua (5).

Unsanitary Premises: Albion, Aldan (2), Aliquippa, Altoona, Apollo (2), Ardmore ((2), Ashland, Ashley, Avalon, Bangor, Bellwood, Bentleyville, Birmingham, Braddock (2), Brownsville, Bryn Mawr, Cambridge Springs Carbondale, Carrolltown, Cherry Tree, Chester (3), Coatsville (2), Cressona, Crum Lynne, Emaus, Emporium (2), Etna (2), Forest City, Freeport, Gilberton, Glenside, Greensburg (2), Hanover, Haverford, Highspire (2), Homestead, Honesdale, Johnstown, Latrobe, Lebanon (3), Lewistown, Little Meadow, Lock Haven, McKeesport, Mifflin, Milton, Minersville, Mt. Joy, Mt. Pleasant, Mt. Union, Nanticoke, Narberth (2), New Philadelphia, Newport, Norristown, Northumberland (2), Oakdale, Osceola Mills, Palo Alto, Penbrook, Pittsburgh (3), Pittston, Port Carbon, Port Royal, Pottstown, Punxsutawney, Rainsburg, Reading (2), Renovo, Rosemont, Royersford, Shenandoah (2), Smethport, Stroudsburg, Sunbury (2), Towanda, Trainer, Tyrone, Upper Darby Township, Delaware County, Verona, Washington, West Chester, West Manayunk, West Newton, West Pittston (2), West Reading, White Haven, Wilkinsburg, Williamsport (2), Williamstown, Windber, Wyomissing, Youngwood (115).

Dumping Grounds: Ambler, Bridgeport, Carrick, Ellwood City, Erie, Media, Monongahela, Mt. Joy, Pittston, Rochester, State College, Wellsboro, West Newton, Womelsdorf (14).

Dead Animals: Carnegie, Moon Run (2).

Slaughter Houses: Howard, Muncy, Williamsburg, Wyoming (4).

Swamp Land and Stagnant Water: Grampian, Harrisburg, Morrisville, Patton, Pennsburg, Philadelphia, Sunbury, Throop (8).

Impure Water and Ice Supply: Dillsburg, Homestead, Lewisburg, Mt. Pleasant, Wrightsville, Towanda (6).

In re Garbage Disposal: Dormont and Swissvale (2).

Rendering Works: Allentown, Columbia, Glendon (3).

Three hundred and twenty-one (321) complaints and petitions were made the subject of special investigations and report by the Engineering Division, of which 315 had been abated. Fifty-eight (58) of these commanded the services of engineers, field inspectors and county medical officers, and 263 commanded the services of the local health officers. Classified, these subjects were as follows:

Nuisances in streams by sewage and industrial wastes	66
Impure water and ice supply	34
Sewerage systems	7
Defective Drainage	1
Garbage and night soil dumps	26
Unsanitary premises	106
Nuisances in street gutters by sewage	44
Dead animals	24
Swamp land and stagnant water	13
	321

The localities of the cases investigated are shown in the following statement:

Nuisances in Streams by Sewage and Industrial Wastes: In Adams County, Tillie; in Allegheny County, Plum Township and Ross Township; in Beaver County, College Hill and Hopewell Township; in Bedford County, Hopewell, Kearney and Londonderry Township; in Berks County, Cumru Township, Leesport, Muhlenberg Township and Reading; in Blair County, Tyrone; in Bucks County, Bristol and Langhorne; in Butler County, Allegheny Township and Harrisville; in Cambria County, Gallitzin; in Chester County; Devon and Highland Township; in Clarion County, Clarion; in Clearfield County, Gulich Township; in Clinton County, Wayne Township; in Columbia County, Beaver Township; in Dauphin County, Swatara Township, Upper Paxton Township and Washington Township; in Delaware County, Lenni and Lima; in Greene County, Franklin Township; in Huntingdon County, Huntingdon; in Jefferson County, Washington Township; in Juniata County, Turbett Township; in Lancaster County, Gaernarvon Township and New Providence; in Lawrence County, New Castle and Pulaski; in Lebanon County, Heidelberg Township and Palmyra; in Lehigh County, Vera Cruz; in Luzerne County, Conygham; in Lycoming County, Limestone Township; in McKean County, Ludlow; in Monroe County, Reeders; in Montgomery County, Bridgeport, Upper Gwynedd Township, Upper Providence Township and West Point; in Northampton County, Flicksville; in Potter County, Brookland and Harrison Valley; in Schuylkill County, Middleport, Port Clinton and West Peen Township; in Susquehanna County, Heart Lake; in Tioga County, Hoytville; in Union County, Lewis Township; in Venango County, Cranberry Township; in Wayne County, Creamton; in Westmoreland County, Hempfield Township and Lower Burrell Township (4); in Wyoming County, Beaumont; in York County, North Codorus Township.

Impure Water and Ice Supply: In Allegheny County, Bellevue; in Beaver County, Colona; in Berks County; Birdsboro, Reading and Sinking Springs; in Blair County, Logan Township and Snyder Township; in Bucks County, Parkland; in Cambria County, Portage Township; in Chester County, Kennett Township, Sugartown and Willistown Township; in Clearfield County, Falls Creek; in Clinton County, Greenburr; in Cumberland County, East Pennsboro Township and Silver Spring Township; in Dauphin County, Halifax and Harrisburg; in Fayette County, Uniontown; in Franklin County, Fayetteville; in Fulton County, McConnellsburg; in Lackawanna County, Peckville; in Lebanon County, Campbelltown, Colebrook and Jonestown; in Luzerne County, Chauncy and Nescopeck Township; in Lycoming County, Muncy; in Mifflin County, Arnot; in York County, Chanceford Township, Cly and East Manchester Township.

Sewerage Systems: In Beaver County, Ambridge; in Chester County, Chester Springs and Phoenixville; in Cumberland County, New Cumberland; in Delaware County, Darby; in Montgomery County, Bridgeport; in Perry County, Loysville.

Defective Drainage: In Westmoreland County, Jacobs Creek.

Garbage and Night Soil Dumps: In Allegheny County, Collier Township Ohio Township (3), Patton Township; in Armstrong County, Parkes Township; in Bucks County, Buckingham Townships; in Centre County, Philipsburg; in Dauphin County, Susquehanna Township, Swatara Township and Washington Township; in Erie County, Mill Creek Township; in Lawrence County, Shenango Township; in Lebanon County, Mt. Gretna; in Luzerne County, Plymouth Township; in Montgomery County, Fort Washington; in Northampton County, Palmer Township; in Potter County, Pike Township; in Washington County, Smith Township; in Westmoreland County, Allegheny Township, East Huntingdon Township, Hempfield Township and Lower Burrell Township; in York County, Springgarden Township.

Unsanitary Premises: In Adams County, Federal and Hamilton Townships (2); in Allegheny County, Monroeville, Noblestown, North Versailles Township, Versailles Township; in Armstrong County, Goheenville, Kaylor and Kiskiminetas Township; in Bedford County, East St. Clair Township and Londonderry Township (2); in Berks County, Cumru Township, Lessport, Mohnton and Union Township; in Bradford County, Powell; in Bucks County, Buckingham Township, Danboro (2), Dublin, Eden, Ivyland, Penn Valley and Upper Black Eddy; in Butler County, Allegheny Township; in Cambria County, Portage and Summit; in Cameron County, East Emporium; in Carbon County, Audenried; in Centre County, Howard Township and Sandy Ridge; in Chester County, Berwyn, Devon (2), East Coventry Township, Pomeroy and Tredyffrin Township; in Clearfield County, Penfield; in Clinton County, Mackeyville; in Columbia County, Mainville and Scott Township; in Cumberland County, Enola; in Dauphin County, Lower Swatara Township, Susquehanna Township (4), Swatara Township and Wiconisco Township; in Delaware County, Haverford Township and Llanerch (2); in Erie County, Mill Creek Township; in Fayette County, Brier Hill, Dunbar Township and McClellandtown; in Huntingdon County, Union Furnace, Warriors Mark (2); in Indiana County, Arcadia and Covode; in Lancaster County, Hopeland, Lincoln and Vintage; in Lawrence County, Edinburg; in Lebanon County, Annville, Fredericksburg, Jackson Township, Lawn and North Lebanon Township; in Lehigh County, Emerald; in Luzerne County, Albert, Hanover Township and Hazle Township; in Mercer County, West Salem Township; in Montgomery County, Bryn Mawr, Eagleville, Haverford Township, Huntingdon Valley, Upper Merion Township; in Northampton County, Northampton, Plainfield Township and Upper Mt. Bethel Township; in Schuylkill County, Ravine; in Snyder County, Swineford; in Somerset County, Shankville and Somerset Township; in Susquehanna County, Clifford and Harmony Township; in Tioga County, Ansonia; in Venango County, Reno; in Warren County, Grand Valley; in Washington County, Canton, Chartiers Township, East Pike Run Township and Gastonville; in Westmoreland County, Derry Township, East Huntingdon Township, Rostraver Township, Sewickley Township; in Wyoming County, Eatonville; in York County, Hopewell Township, Newberrytown and Springgarden Township.

Nuisances in Street Gutters by Sewage: In Allegheny County, Creighton and O'Hara Township; in Armstrong County, Madison Township; in Berks County, Amityville and Shoemakersville; in Bucks County, Doylestown and Milford Square; in Cambria County, Elder Township and St. Bonifacius; in Centre County, Hublersburg; in Chester County, Valley Forge; in Cumberland County, West Fairview; in Dauphin County, Heckton Mills and Wiconisco; in Delaware County, Glen Mills, Haverford Township and Llanerch; in Fayette County, Banning and Spring Hill Township; in Huntingdon County, Spruce Creek and Warriors Mark; in Lackawanna County, Carbondale Township, in Lancaster County, Florin; in Lebanon County, Newmanstown; in Luzerne County, Dupont; in Lycoming County, Loyalsock Township; in Montgomery County, Limerick Township, Upper Gwynedd Township (3) and Willow Grove; in Schuylkill County, Sheppton and West Mahanoy Township; in Snyder County, Beavertown (2) and Freeburg; in Somerset County, Elk Lick Township and Somerset Township; in Susquehanna County, Herrick Centre; in Westmoreland County, Browntown, Penn Township (2) and Rostraver Township; in York County, Emigsville.

Dead Animals: In Bedford County, Londonderry Township and Maria; in Bucks County, Springfield Township; in Centre County, Haines Township and Potter Township; in Clinton County, Chapman Township; in Crawford County, Cambridge Township; in Franklin County, Southampton Township and Warren Township; in Indiana County, Arcadia and Burrel Township; in Lancaster County, Rapho Township; in Lawrence County, Neshannock Township, in McKean County, Foster Township; in Mifflin County, Mattawanna; in Northampton County, Plainfield Township and Republic; in Northumberland County, Lewis Township; in Perry County, Penn Township; in Somerset County, Lower Turkeyfoot Township; in Washington County, Carroll Township and North Franklin Township; in Westmoreland County, Harrison City and Ruffsdale.

Swamp Land and Stagnant Water: In Allegheny County, Blair Station and Jefferson Township; in Chester County, Berwyn; in Dauphin County, Union Deposit; in Delaware County, Essington and Springfield Township; in Lancaster County, Neffsville; in Lebanon County, North Lebanon Township and Palmyra; in Luzerne County, Jenkins Township; in Montgomery County, Upper Dublin Township; in Perry County, Liverpool Township; in Wyoming County, Tunkhannock.

10. ORDERS OF ABATEMENT.

To do away with possible causes of disease and mortality in the way of public menaces and nuisances, more especially outside of boroughs and cities and within the watersheds of the State, the Commissioner of Health has the power and authority to order such nuisances and menaces to be abated and removed. Upon examination made by any persons duly authorized by the Commissioner of Health so to do, information as to the facts is submitted to this office and thereupon an order to abate may be issued. These orders are signed by the Commissioner of Health and served by the field or local health officers. Many hundreds of properties have been put in sanitary condition upon inspection and the verbal request of the field or local health officer, without resort to the issuing of a formal order of abatement.

Eleven thousand three hundred and seventy-three written orders have been prepared for issuance during the year. Except for about 105, these notices have been made out as the result of inspections by the Department's field officers and have been for the abatement of nuisances polluting or menacing the purity of streams from which public water supplies are drawn. The 105 orders referred to have been for the abatement of unsanitary conditions in general, mostly reported by local health officers. A more detailed statement of these orders of abatement is given elsewhere in this report.

11. DRAFTING.

The work of the drafting room has continued the same as in preceding years and is carried on as part of the work of the section of design and construction of the Engineering Division. It consists chiefly of map tracing and chart making for the various divisions of the Department. As in 1909, the particular work of the force was the compiling of township atlases of the various counties in the State from material furnished by atlases, the U. S. Geological Survey Sheets and the Section of Field Inspection. Besides this regular work, county, township, borough and village were made for the use of the field inspectors and a number of charts, maps, forms and diagrams were prepared for the Local and Statistical Divisions of the Department.

The Berks County atlas was entirely completed during the year and the Bucks, Chester and Washington County atlases were started. The following data was placed on the township, borough and village maps: All properties numbered according to inspections (which were also placed on index sheets showing names of property owners and tenants alphabetically arranged): the location of properties and sources of supply of water companies and in Berks County, the property owned by the State for the tuberculosis sanatorium, near Hamburg

Greater difficulties were encountered on the Berks County atlas than on that for Allegheny County The latter county was inspected by townships, each having its own set of numbers, while in Berks County inspectors were made by watersheds composed of two or six townships, one set of numbers being used for each water shed. As the line between these watersheds is ill defined, duplication of inspections frequently occurred, resulting in some confusion in the tabulation of the same. This trouble was overcome in the office.

The following tabulation shows in detail the work that has been completed during the year:

Name of County.	Number of Maps Made.		
	Townships.	Boroughs and village.	Index sheets.
Adams,		1	
Armstrong,	4		
Bedford,	5		
Bradford,		2	
Blair,	2		
Butler,	4		
Bucks,	25	36	52
Berks,	6	50	53
Cambria,	20		
Clarion,	8		
Clearfield,	2	1	
Columbia,	2		
Clinton,	1		
Carbon,	3		
Chester,	6	10	
Jefferson,	2		
Lackawanna,	10		
Luzerne,	14		
McKean,	14		
Northampton,	6		
Potter,	17		
Tioga,	14		
Venango,	22		
Warren,	5		
Wayne,	1		
Westmoreland,	5		
Totals,	198	100	105

Special Maps, Charts and Forms: The total number of maps prepared during the year for all sections and divisions of the Department was 485.

III. ENGINEERING

12. WATER WORKS AND SEWERAGE APPLICATIONS

The review of plans of proposed sewerage and water works systems, and of extension to existing systems, and the making of investigations and reports in relation thereto has been an important part of the work performed by the Engineering Division.

There were 286 sewerage and water works applications received by the Department and recorded during the year; 118 pertaining to water works and 168 pertaining to sewerage. Of the water works applications, 28 were sent in by municipalities and 90 by private corporations. Of the sewerage applications, 147 were made by municipalities and 21 by private corporations and individuals.

The water works applications may be classified as follows: Thirty-five for ground water sources; 4 for both ground and surface waters; and 79 for surface water sources, in 20 cases of which the plans provided for purification by filtration of the surface waters and in 12 additional instances the surface waters were being filtered at the time the applications for extensions were made namely, in the following cases:

WATER WORKS APPLICATIONS WHERE SUPPLY WAS BEING FILTERED.

1. Butler Water Company.
2. Butler Water Company (Second Application).
3. Butler Water Company (Third Application).
4. Butler Water Company (Fourth Application).
5. Donora Water Company (Supply from Monessen Water Co.).
6. Eagles Mere Water Company.
7. Harrisburg City.
8. Harrisburg City (Second Application).
9. Norristown Insurance & Water Company.
10. Norristown Insurance & Water Company (Second Application).
11. Pennsylvania Water Company.
12. York Water Company.

The applications for permits to supply water from new water filter plants are given below:

WATER WORKS APPLICATIONS PERTAINING TO PROPOSED FILTER PLANTS.

1. Bristol Borough.
2. Brookville Water Company.
3. Brookville Water Company (Second Application).
4. Brookville Water Co. (Third Application).
5. Charleroi Water Co.
6. Eagles Mere Water Co.
7. Ellwood Water Company.
8. Gravel Hill Water Supply Co. (Supply from Lebanon Valley Consolidated Water Supply Co.).
9. Greencastle Borough.
10. Greencastle Borough (Second Application).
11. Lebanon Valley Consolidated Water Supply Co.
12. Masontown Borough.
13. Moreland Spring Water Co.
14. North Annville Water Supply Co. (Supply from Lebanon Valley Cons. Water Sup. Co.).

15. North Cornwall Water Supply Co. (Supply from Lebanon Valley Cons. Water Supply Co.).
16. Quarryville Water Co.
17. Schuylkill Haven Gas & Water Co.
18. Schuylkill Haven Gas & Water Co. (Second Application).
19. South Annville Water Supply Co. (Supply from Lebanon Valley Cons. Water Sup. Co.).
20. Suburban Water Co. of Allegheny County, Pa.

The sewerage applications may be classified as follows: Fifty-two for sanitary systems to take sewage only; 71 for combined system to receive both sewage and storm water; 33 for sewage disposal works; and 12 for extension of time.

The application for sewage disposal plants are given below.

APPLICATIONS FOR NEW SEWAGE DISPOSAL PLANTS FOR IMPROVEMENTS TO OLD PLANTS.

1. Bradford City.
2. Butler.
3. Chester.
4. Coudersport.
5. Darby.
6. Dormont.
7. Doylestown Sewerage Co. (New Design).
8. Freeport.
9. Harrisburg.
10. Hastings.
11. Houtzdale.
12. Jefferson County Commissioners.
13. Lansdowne.
14. Lehigh County Commissioners.
15. Lehighton.
16. Mars.
17. Mars (Second Application).
18. Morganza State Reform School (Modified Design).
19. Mt. Gretna Park (New Design).
20. Mt. Gretna Park (Second Application).
21. Mt. Pleasant.
22. Nelson Valve Co.
23. Norristown State Hospital.
24. Philadelphia (Pennypack Dist.)
25. Pleasantville.
26. Sharpsville.
27. Stoneham Tannery of Elk Tanning Co. (Modified Design).
28. Susquehanna.
29. Valley Camp Association.
30. Villa Maria Convent.
31. West Chester.
32. West Newton.
33. West Pittsburg Realty Co.

Places making applications for extension of time in which to fulfill the terms of the decrees issued by the Commissioner of Health and to continue the discharge of sewage into the waters of the State are as follows:

SEWERAGE APPLICATIONS FOR EXTENSION OF TIME.

1. Aliquippa.
2. Clearfield.
3. Fair Oaks Land Co.
4. Glenolden.
5. Jeannette.
6. Mt. Union.

7. North East.
8. Osborne.
9. Suburban Drainage Co. (Adjacent to Harrisburg).
10. West Brownsville.
11. West View.
12. Williamsport.

Of the 286 applications recorded during the year 225 have been examined and reported upon, besides 6 applications left over from 1906, 6 from 1907, 6 from 1908 and 42 from 1909, making a total of 285 applications investigated and reported upon during the year.

The applications of the following public or private corporations were dismissed or withdrawn: Crawford County Alms House at Saegerstown, recorded in 1906; Lancaster and Mt. Lebanon School Plan of Lot, recorded in 1907; Allegheny City Home; Citizens Water Co. of Sheffield Township; Glenolden Free Hospital for Poor Consumptives at White Haven, and also duplicate entries of 4 applications from Phildelphia, all recorded in 1908; Rural Valley; Citizen of Cynwyd, Lower Merion Township; Wrightsville Water Supply Co., recorded in 1909; Villa Maria Convent in Mahoning Township, Lawrence Co.; Conneaut Lake Borough and Port Matilda Village in Worth Township, Centre Co., recorded during the current year, making a total of 17 dismissals.

In 214 cases conclusions have been reached and a permit or decree has been duly issued by the Commissioner of Health. Of these 214 cases, 103 relate to water works and 111 to sewerage and sewage disposal work.

With respect to the water works permits and decrees issued during the year, 52 embrace surface sources, 22 ground water sources, and 29 a combination of the two. In 46 cases purification of the surface waters is required and in one case purification of ground water is required. The 47 cases where purification is required or approved are as follows:

WATER PERMITS APPROVING OR REQUIRING FILTRATION.

1. Beaver Creek Water Co.
2. Berwick Water Co.*
3. Bristol Borough.
4. Bristol Water Co.
5. Brookville Water Co.
6. Brookville Water Co. (Second Permit).
7. Butler Water Co.
8. Charleroi Water Co.
9. Clymer Water Co. of Indiana.
10. Cresson Water Co.
11. Dingmans Ferry Water Co.
12. Donora Water Co.
13. Eagles Mere Water Co. (Lake source).
14. Falls Creek Borough.
15. Gravel Hill Water Supply Co.
16. Greencastle Borough (Ground water).
17. Harrisburg City.
18. Jenkintown Water Co.
19. Latrobe Water Co.*
20. Lebanon Valley Consolidated Water Supply Co.
21. Lebanon Valley Consolidated Water Supply Co. (Second Permit)*
22. Lehigh Water Co. (Easton).
23. Masontown Borough.
24. Monessen Water Co.
25. Moore Water Co.
26. Moreland Spring Water Co.
27. Moreland Spring Water Co. (Second Permit).
28. Myerstown Water Co. (Lake source).
29. North Annville Water Supply Co.
30. North Cornwall Water Supply Co.
31. Ogontz Water Co.
32. Pennsylvania Industrial Reformatory (Huntingdon).
33. Pennsylvania Water Co.
34. Quarryville Water Co.

35. Quarryville Water Co. (Second Permit).*
36. Schuylkill Haven Gas & Water Co.
37. Schuylkill Haven Gas & Water Co. (Second Permit).
38 South Annville Water Supply Co.
39. Stroudsburg Water Supply Co.
40. Suburban Water Co. of Allegheny County, Pa.
41. Suburban Water Co. of Allegheny County, Pa. (Second Permit).*
42. Sunbury Water Co.
43. Unity Water Co.
44. Weldon Water Co.
45. West Chester Borough.
46. West Pittsburg Water Co.
47. York Water Co.

*Temporary chemical germicidal treatment approved or required, pending installation of filtration plant.

The applications for Nos. 1, 4, 9, 10, 18, 24, 25, 26, 28, 31, 40, 42, 43, 44, 45 and 46 in the above table were received prior to 1910. No. 32 was issued without a formal application as the result of a typhoid outbreak.

With respect to the sewerage permits and decrees, 46 involve sewage disposal works and the other 65 relate to sewers and ultimate treatment of the sewage, as more fully hereinafter appears. Sewage disposal applications in 6 instances from the preceding table entitled "Applications for New Sewage Disposal Plants or Improvements to Old Plants," namely Nos. 1, 2, 8, 9, 27 and 29, are pending. It will be noticed that No. 30 is among those withdrawn.

A brief summary relative to water works and sewerage received and acted upon since the inauguration of the Department is given below. A more complete summary appears under the division of this report of the Engineering Division entitled "Water Works Permits and Sewerage and Sewage Disposal Permits."

SUMMARY OF APPLICATIONS RECEIVED AND ACTED UPON.

Applications received in 1905-06	155
Applications received in 1907	236
Applications received in 1908	306
Applications received in 1909	324
Applications received in 1910	236
Total,	1307
Applications acted upon in 1905-06	74
Applications acted upon in 1907	159
Applications acted upon in 1908	266
Applications acted upon in 1909	278
Applications acted upon in 1910	282
Total,	1059

There were 219 applications pending at the end of 1910, 29 having either been dismissed or withdrawn. Of the 219, 110 are for water works and 109 for sewerage and sewage disposal. Of these, 64 of the water works and 41 of the sewerage were investigated, leaving 114 applications to be investigated.

The 1,307 applications comprise 454 water works and 853 sewerage systems. Of the former, 96 were for municipal and 358 for private plants and of the sewerage, 750 were for municipal and 103 for private works.

It may be interesting to note that 129 of the water applications concerned ground sources, 4 both ground and surface, and 321 surface sources; that in 68 instances the surface waters were being filtered and that in 56 instances filtration of the surface waters was contemplated. The applications as received by years are shown in the following table:

WATER WORKS APPLICATIONS.

Class of Application.	1905-06	1907	1908	1909	1910	Total.
Concering surface sources,	23	47	75	97	79	321
Concerning ground and surface sources,					4	4
Concerning ground sources,	11	24	32	27	35	129
Total,	34	71	107	124	118	454
Where surface waters were being filtered,	1	6	26	23	12	68
Where filters were contemplated,	2	11	11	12	20	56
Total,	3	17	37	35	32	124

So it appears that in 124 instances plans for new water filter plants or plans for extensions to existing plants or the methods of operation have been carefully considered and passed upon, or will engage the attention of the Department at an early date.

On December 31st, 1910, there were 85 filter plants in operation or under construction for the purpose of supplying water to the public in Pennsylvania. These places are shown alphabetically in the following table:

WATER FILTER PLANTS IN USE OR BEING ERECTED.

1. Apollo.
2. Beaver Creek Water Co. (Rutherford Heights).
3. Beaver Valley Water Co. (Eastvale plant, Beaver County).
4. Beaver Valley Water Co. (New Brighton plant, Beaver County).
5. Bristol.
6. Butler.
7. Cambridge Springs.
8. Canton.
9. Carlisle.
10. Charleroi (Building).
11. Chester.
12. Clarion.
13. Columbia.
14. Connellsville.
15. Danville.
16. Danville State Hospital.
17. Eagles Mere.
18. Elizabeth.
19. Ellwood City (Borough).
20. Enola.
21. Ernest.
22. Franklin.
23. Freeport.
24. Gettysburg.
25. Harrisburg.
26. Holmesburg, Philadelphia.
27. Hummelstown.
28. Huntingdon.
29. Indiana.
30. Iselin.
31. Kittanning.
32. Lancaster.
33. McKeesport.
34. Mechanicsburg.

35. Media.
36. Middletown.
37. Monessen.
38. Monongahela.
39. Moreland Spring Water Co.
40. Morganza State Reform School (Building).
41. Natrona.
42. New Bethlehem.
43. New Castle.
44. Newport.
45. Norristown.
46. North East.
47. North Springfield Water Co., Pickering Creek, Chester Co., Mechanical Filters.
48. North Springfield Water Co., Pickering Creek, Chester Co., Slow Sand Filters.
49. Pennsylvania Water Co. (Pittsburgh Suburbs).
50. Philadelphia—Belmont Plant.
51. Philadelphia—Lower Roxborough Plant.
52. Philadelphia—Queen Lane Plant.
53. Philadelphia—Torresdale Plant.
54. Philadelphia—Upper Roxborough Plant.
55. Pittsburgh.
56. Pottstown.
57. Punxsutawney.
58. Reading—Antietam Plant (In Use).
59. Reading—Bernhart Plant (In Use).
60. Reading—Egelman Plant (In Use).
61. Reading—Maiden Creek Plant (Building).
62. Ridgway.
63. Riverton Consolidated Water Co., Cumberland Co. (Building).
64. Royersford & Spring City.
65. St. Benedict.
66. Sayre & Athens.
67. Scranton.
68. Sharon & South Sharon.
69. South Bethlehem.
70. South Pittsburgh.
71. Springfield Consolidated Water Co., Neshaminy Creek Plant, Bucks County.
72. Springfield Water Co., Crum Creek Plant, Delaware County.
73. Spring Grove.
74. Steelton.
75. Sunbury.
76. Tarentum.
77. Vandegrift.
78. Washington.
79. Warren.
80. Waynesburg.
81. West Pittsburg (Building).
82. West Reading.
83. Wilkes-Barre—Crystal Lake Plant.
84. Wilkes-Barre—Huntsville or Toby Creek Plant.
85. York.

With respect to the sewerage applications received since the inauguration of the Department, 288 relate to sanitary sewers, 404 to combined, 135 to disposal works and 26 have been for extensions of time. The applications as received by years are shown in the following table:

SEWER AND SEWAGE DISPOSAL APPLICATIONS.

Class of Application.	1905-06	1907	1908	1909	1910	Total
Sanitary sewers,	39	68	81	48	52	288
Combined sewers,	68	71	82	112	71	401
Disposal works,	14	26	33	29	33	135
Extension of time,			3	11	12	26
Total,	121	165	199	200	168	853

So it appears that in 135 instances plans for sewage treatment plants have been considered and passed upon or will engage the attention of the Department at an early date.

On December 31st, 1910, there were at least 52 sewage disposal plants, big and little, in operation or building in the State. The following table is a list of these plants. There are many more disposal works for smaller enterprises and private estates.

SEWAGE DISPOSAL PLANTS IN USE OR BEING ERECTED.

Cities.

1. Altoona, Blair County.
2. Philadelphia (Pennypack District).
3. Reading, Berks County.

Boroughs.

4. Derry, Westmoreland County.
5. Indiana, Indiana County.
6. New Wilmington, Lawrence County.
7. Washington, Washington County.
8. East Washington, Washington County.

State Institutions.

9. Chester Springs Soldiers' Orphans' School (Chester County).
10. Eastern Penn'a State Institution for the Feeble Minded and Epileptic, near Spring City, Chester County.
11. Penna. Industrial Reformatory, near Huntingdon, Huntingdon County.
12. Penna. Reform School. Morganza, Washington County.
13. Penna. Soldiers' Orphans' Industrial School, Scotland, Franklin County.
14. Penna. State Lunatic Hospital, near Harrisburg, Dauphin County.
15. Penna. State South Mountain Sanatorium, Mont Alto, Franklin County.
16. State Asylum for the Chronic Insane of Pennsylvania, South Mountain, Wernersville, P. O. Berks County.
17. State Homeopathic Hospital for the Insane, near Allentown, Lehigh County.
18. State Hospital for the Insane at Danville, Montour County.
19. State Hospital for the Insane of the Southeastern District, Norristown, Montgomery County.
20. State Institution for Feeble Minded of Western Penna., Polk, Venango County.

County Institutions.

21. Allegheny County Work House, O'Hara Twp., Allegheny County.
22. Lehigh County Home and Almshouse, near Allentown, Lehigh County.

City Institutions.

23. Allegheny City Home, O'Hara Twp., Allegheny Co.
24. Pittsburgh Water Works Department, Sewerage at Filter Plant near Aspinwall, Allegheny County.

Drainage Corporations.

25. Devon Drainage Company, Devon, Chester County.
26. Doylestown Sewerage Company, Doylestown, Bucks County.
27. Hanover Sewer Company, Hanover, York County.
28. Wayne Sewerage Company, Wayne, Delaware County.

Land Improvement Companies.

29. Enola Realty Company, Enola, Cumberland County.
30. Palmer Land Company, Palmerton, Carbon County.

Associations and Private Systems for Boroughs and Villages.

31. Bryn Athyn Village Association, Bryn Athen, Montgomery County.
32. Cressman, Philip, for Perkasie, Bucks County.
33. Mt. Gretna Park, Lebanon County.
34. South Wayne Plant, Wayne, Delaware County.

Private Institutions.

35. Dermady Sanatorium, Morton, Delaware County.
36. Free Hospital for Poor Consumptives, White Haven, Luzerne County.
37. Girls' Department, House of Refuge, Darlington, Delaware County,
38. Haverford College, Haverford, Delaware County.
39. Philadelphia Jewish Sanatorium for Consumptives, Eagleville, Montgomery County.
40. Tressler Orphan Home, Loysville, Perry County.
41. Villanova College, Villanova, Delaware County.
42. Western Pennsylvania Hospital for the Insane, Dixmont, Allegheny County.
43. Williamson Free School of Mechanical Trades, Delaware County.

Industrial Corporations.

44. Elk Tanning Company, Tannery at Stoneham, Warren County.
45. Howard Tannery, near Corry, Erie County.
46. Morrisville Rubber Works, Morrisville, Bucks County.
47. Nelson Valve Company, near Chestnut Hill, Montgomery County.
48. New Jersey Zinc Company, Pulmerton, Carbon County.
49. Pennnsylvania Glue Company, Springdale, Allegheny County.

Miscellaneous.

50. Parkside Hotel, Willow Grove, Montgomery County.
51. Warren Water Company, sewerage at Filter Plants, near Warren, Warren County.
52. Willow Grove Park, Montgomery County.

WATER WORKS

13. WATER WORKS PERMITS AND DECREES ISSUED BY THE COMMISSIONER OF HEALTH UP TO JANUARY 1st, 1911.

This work has been done under Act 182, approved April 22, 1905. The law is entitled, "An Act to preserve the purity of the waters of the State for the protection of the public health." The term, "Waters of the State" is defined to include all streams and springs, and all bodies of surface and of ground water, whether natural or artificial, within the boundaries of the State.

Acting under this law, which prescribes that no water works for the supply of water to the public shall be constructed or extended, or an additional source of supply be secured, without a written permit, to be obtained from the Commissioner of Health, the scope of inquiry in each case has been strictly confined to whether the supply be prejudicial to public health.

The Virgin waters of the State are pure. They often gather in their devious courses, on or below the surface of the ground, foreign matter of a poisonous character. To preserve their purity absolutely is impossible, but approximations may be achieved. The results frequently concern the removal of impurities injurious to public health under conditions demanding continual supervision by the State.

Precedent to judgment in any particular case, the full information as to the source of supply and capacity, the manner of collection and the means of distribution is indispensable; with respect to the source, principally as to danger to be guarded against and means necessary for protection; with respect to capacity, because, besides other reasons, where a supply be altogether good and limited, consumers may be compelled by shortage to have frequent recourse to private wells and neighborhood springs in close proximity to and polluted by cesspool or privy drainage, or other sewage contamination, or because recourse may be frequently had to a polluted stream as the supplementary supply, and thus spread disease in the town, conditions which the law does not contemplate the State authorities should overlook or sanction; with respect to details, because, besides other reasons, the interests of the public health require that ample facilities for quick drainage or shutting off of any part of the system shall be provided, or where a filter may amply purify water in ordinary times, during a fire the speeding up may be at a rate entirely beyond the purifying capacity and thus sewage water be introduced into town, or direct recourse may be had to raw creek water for emergencies.

In connection with the subject, it may be important to know about the private wells and springs in the town.

For the dissemination of the information gathered by the Department, the permits or decrees to the local authorities or water company officials set forth quite fully the local conditions under which an additional source of supply or an extension to existing water works will not be prejudicial to public health. The stipulations in the decree refer to provisions for removal of sources of pollution, or to protective measures, such as sanitary patrol of watersheds and the reporting thereof, efficient operation of purification works, and to other safeguards necessary or that may be required by the Commissioner of Health in case the water works system or any part thereof, or the water supplied thereby becomes prejudicial to public health at any time.

There have been 307 water works permits or decrees issued since the creation of the State Department of Health.

WATER WORKS PERMITS AND DECREES ISSUED.

Water works permits and decrees issued 1905-06,	23
Water works permits and decrees issued 1907,	25
Water works permits and decrees issued 1908,	72
Water works permits and decrees issued 1909,	84
Water works permits and decrees issued 1910,	103
	307

In some instances several permits were issued to the same party. The 307 permits or decrees involve 238 owners of water works systems, as follows:

Municipal water works systems,	45
Water works corporations,	166
State institutions,	4
Associations and private citizens,	18
Industrial works,	3
	238

There are 345 cities, boroughs and townships in Pennsylvania now being supplied with water by water works systems that have been examined and made the subjects of decrees by the Department. A water company may supply several towns and in a number of municipalities more than one water company are operating, as will appear in the detailed statement that follows:

WATER WORKS PERMITS AND DECREES ISSUED BY THE COMMISSIONER OF HEALTH AND PLACES SUPPLIED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905-1909.	1910.	Total.
1	Abington Twp. (Springfield Cons.) W. Co.) (Weldon W. Co.)						
2	Albion (See also Albion W. Co.),	1				1	1
			1. Albion W. Co. (Albion),		1		1
3	Aldan (Springfield W. Co.),						
				1. Alwine, Jerry (Johnstown),	1		1
	Annville Vil. (N. & S. Annville Twps.)		2. Annville W. Co.,		6		6
4	Arendtsville,		Arendtsville W. Co.,			1	1
5	Athens (Fairview W. Co.),						
6	Austin,	2			1		1
7	Avalon (Ohio Valley W. Co.),						
8	Avonmore,	3				1	1
9	Baden,	4			1		1
			4. Bald Eagle W. Co. (Tyrone),			1	1
10	Barnesboro,		5. Barnesboro W. Co. (Sup. also Spangler),		1		1
			6. Beaver Creek W. Co. (Swatara Twp.),			1	1
11	Bellevue (Ohio Valley W. Co.),						
12	Ben Avon (Ohio Valley W. Co.),						
13	Bensalem Twp. (Trevose Manor Spring W. Co.)						
			7. Bens Creek W. Co. (Portage Twp.),		1		1
14	Berwick,		8. Berwick W. Co.,		1	1	2
15	Bethlehem,	5			2		2
16	Bigler Twp. (Madera W. Co., (Ramey W. Co.)						
17	Biglerville,		9. Biglerville W. Co.,		1		1
18	Big Run (Punxsutawney W. Co.),						
19	Black Lick Twp. (Marie W. Co.), (Nant-y-Glo W. Co. Uninc.)						
			10. Blackwood W. Co. (Reily Twp.),		1		1
			11. Blandburg W. Co. (Reade Twp.),			1	1
			12. Bloomfield Water & Sewer Co. (New Bloomfield.)		1		1
20	Blossburg,		13. Blossburg W. Co.,		1		1
			14. Blue Ridge W. S. Co. (Washington Twp.)		1		1

	Boalsburg Vil. (Harris Twp.),		15. Boalsburg W. Co.,			1	1
				2. Boyer, J. Calvin (Monroe Twp.),		1	1
				3. Boyer, J. Calvin (Perry Twp.),		1	1
21	Brackenridge (Tarentum W. Co.),						
22	Braddock Twp. (Penna. W. Co.),						
23	Bradford City,	6			2	1	3
24	Bradford Twp. (Bradford W. Co.)		16. Bradford County W. Co. (Sayre),		1		1
25	Briar Creek Twp.,		17. Briar Cr. W. S. Co.,		1		1
				4. Brickel, B. W. (Dallas),	1		1
26	Bridgeton Twp. (Raymond D. Stone).						
			18. Bright Run W. Co. (Butler Twp.),			1	1
27	Brisbin (W. Houtzdale W. Co.),						
28	Bristol (See also Bristol W. Co.),	7				1	1
			19. Bristol W. Co.,		1	1	2
29	Brockwayville,		20. Brockway Crystal W. Co.,			1	1
30	Brookville,		21. Brookville W. Co. (Also sup. Rose Twp.)			2	2
				5. Bucher, J. C. (S. Middletown Twp..		1	1
31	Burrell Twp. (Josephine W. Co.),						
32	Butler,		22. Butler W. Co.,			1	1
33	Butler Twp. (Bright Run W. Co.),						
34	Cambridge Springs,	8			2		2
35	Camp Hill (Riverton Cons. W. Co.),						
36	Carroll Twp. (Donora W. Co.),						
37	Cass Twp. (Minersville W. Co.),						
38	Catasauqua,	9			2		2
39	Catawissa,		23. Catawissa W. Co.,			1	1
40	Cecil Twp. (State Reform School, Morganza.)						
41	Chambersburg,	10			1		1
42	Chapman Twp. (Absalom Farwell)						
43	Charleroi,		24. Charleroi W. Co. (Fallowfield Twp. & N. Charleroi B.)			1	1
44	Cheltenham Twp. (Ogontz W. Co.), (Springfield Cons. W. Co.)						
45	Chester City (New Chester W. Co.),						
46	Chester Twp. (Edgemont W. Co.),						
			25. Chichester W. Co. (Marcus Hook),		2		2
			26. Citizens W. & Gas Co. of Williamsport,			1	1
			27. Citizens W. Co. of Gordon,			1	1
			28. Citizens W. Co., of Kittanning (also sup. Rayburn Twp. & Wickboro.)		1		1
			29. Citizens W. Co. of New Bethlehem, (Sup. S. Bethlehem, Armstrong Co. & N. Bethlehem, Clarion Co.)		1		1
47	Clarion,		30. Clarion W Co.,		3		3
48	Clearfield,		31.. Clearfield W. Co.,		1		1

WATER WORKS PERMITS—CONTINUED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905-1909.	1910.	Total.
49	Clifton Heights (Springfield W. Co.),						
			32. Clymer W. Co. (Indiana),		2	1	3
50	Coaldale (Panther Valley W. Co.),						
51	College Twp. (University W. Co.),						
52	Collingdale (Springfield W. Co.),						
53	Colwyn (Springfield W. Co.),						
54	Conneautville,	11				1	1
55	Conshohocken (Springfield Cons. W. Co.)						
56	Conway,	12			1		1
57	Conyngham Twp. (Glen Brook W. Co.)						
58	Cressona (Schuylkill Haven G. & W. Co.)						
59	Cresson (See also Cresson W. Co.),	13				1	1
60	Cresson Twp.,		33. Cresson W. Co. (also sup. Cresson & Sankertown.)			1	1
				6. Crosby Gas Co. (Norwick Twp.).	1		1
				7. Curtis (J. G.) Leather Co., (Hamilton Twp.)		1	1
61	Dale (Johnstown W. Co.),						
62	Dallas (see also B. W. Brickel),		34. Dallas W. Co.,		1		1
	Danville (see State Hospital.)						
63	Darby (Springfield W. Co.),						
64	Darby Twp. (Springfield W. Co.),						
65	Dauphin,		35. Dauphin Cons. W. S. Co. (also sup. E. Pennsboro Twp., Cumb. Co. & Middle Paxton & Susquehanna Twps., Dauphin County.)		2		2
66	Delaware Twp. (Dingmans Ferry W. Co.)						
67	Denver,	14			1		1
68	Derry Twp. (M. S. Hershey),						
			36. Diamond W. Co. (Hazleton & West Hazleton.)		1		1
69	Dickson City (Boro Scranton Gas & Water Co.)						

70	Dillsburg,		37. Dillsburg W. Co.,			1	1
			38 Dingmans Ferry W. Co. (Delaware Twp.)			1	1
71	Donora,		39. Donora W. Co. (also sup. Carroll Twp.),			1	1
72	Dover,	15			1		1
73	Doylestown,	16				1	1
74	DuBois (see also Jno. E. DuBois),	17			1		1
				8. DuBois, John E. (DuBois),	1		1
75	Duncannon (Trout Run W. Co.).						
			40. Eagles Mere W. Co.,			1	1
76	East Brady,		41 East Brady W. W. Co.,			1	1
77	East Deer Twp. (Tarentum W. Co.).						
78	East McKeesport,		42 E. McKeesport W. Co. (Also sup. N. Versalles Twp. & Wall & Wilmerding Boros.)		1		1
			43. Eastmere W. Co. (Swatara Twp.),		1		1
79	East Pennsboro Twp. (Riverton Cons. W. Co.) (H. M. Horner.)						
80	East Pittsburg (Penna. W. Co.),						
81	Easton City (S. Easton W. Co.) (Lehigh W. Co.)						
82	Easttown Twp. (Springfield Cons. W. Co.)						
83	East Vincent Twp. (State Institution near Spring City.)						
84	Edinboro,	18				1	1
85	Eddystone (Ridley W. Co.) (Springfield W. Co.)						
			44. Edgemont W. Co. (Chester Twp.),		2		2
86	Edgewood (Penna. W. Co.),						
87	Eldred (Galeton-Eldred W. Co.),						
88	Ellwood City (Boro),		45. Ellwood W. Co.,		2		2
89	Emlenton,		46. Emlenton W. Co.,		1		1
90	Emporium,		47. Emporium W. Co.,		2		2
91	Emsworth (Ohio Valley W. Co.) Enola Vil, E. Pennsboro Twp., (Dauphin Cons. W. S. Co.)						
			48 Extension W. Co. (Penbrook),		1		1
92	Fairchance,	19			1		1
93	Fairview Twp., York Co. (Riverton Cons. W. Co.)						
			49. Fairview W. Co. (Athens),		1		1
94	Fallowfield Twp. (Charleroi W. Co.)						
95	Falls Creek,	20				1	1
				9. Farwell, Absalom (Chapman Twp.),	1		1
96	Ferguson Twp., (University W. Co.),						
97	Ferndale (Johnstown W. Co.)						
	Foxburg Vil. (Richland Twp., Clar. Co.).		50. Foxburg W. W. Co.,		1		1
98	Franklin City (Venango W. Co.) purchased by city.)						

WATER WORKS PERMITS—CONTINUED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905-1909.	1910.	Total.
99	Freeport,		51. Freeport W. Co.,		1		1
100	Galeton,		52. Galeton-Eldred W. Co. (Also sup. Eldred)			1	1
101	Gilberton,		53. Gilberton-Schuylkill W. Co.,			1	1
102	Girardville,		54. Girardville W. Co.,			1	1
			55. Gladehurst W. Co. (Somerset Twp.),		1		1
			56. Glen Brook W. Co. (Conyngham Twp.),		1		1
103	Glenolden (Springfield W. Co.),						
104	Glen Rock,	21				1	1
105	Gordon (Citizens W. Co. of Gordon),		57. Gravel Hill W. S. Co. (N. Londonderry Twp.)			1	1
106	Great Bend (Hallstead W. Co.),						
107	Greencastle,	22				1	1
108	Greensburg (part) (Westmoreland W. Co. of Hempfield Twp.)						
109	Hallstead,		58. Hallstead W. Co. (Also sup. Great Bend.)			1	1
110	Hamilton Twp. (J. G. Curtis Leather Co.)						
			59. Hamilton W. Co. (Saylorsburg)		1		1
111	Hanover,		60. Hanover & McSherrystown W. Co. (Also sup. McSherrystown Boro, Adams Co., & Penn Twp., York County.)		1		1
112	Harrisburg City,	23				1	1
113	Harrison Twp. (Tarentum W. Co.) (Natrona W. Co.)						
114	Harris Twp. (Boalsburg W. Co.) (State College W. Co.)						
115	Haverford Twp. (Springfield W. Co.)						
116	Hazleton City (See also Diamond W. Co.)		61. Hazleton W. Co.,		1		1
117	Hazle Twp. (Milnesville W. Co.),						
118	Heidelberg Twp.,			10. Heidelberg W. Co. (for Schaefferstown village)	1		1
119	Hellam,		62. Hellam W. Co.,			1	1
120	Hellam Twp. (York W. Co.),						

121	Hempfield Twp. (Westmoreland W. Co. of Hempfield Twp.)						
				11. Hershey, M. S. (Derry Twp.),	1		1
122	Honesdale,		63. Honesdale Cons. W. Co.,		1		1
				12. Horner, H. M., (E. Pennsboro Twp.)	1		1
123	Houtzdale,		64. Houtzdale W. Co.,		1		1
124	Hummelstown,		65. Hummelstown Cons. W. Co.,		3		3
125	Huntingdon (See Penna. Ind. Ref.),		66. Huntingdon W. S. Co.,		2		2
126	Indiana (Clymer W. Co.),						
127	Irwin (Westmoreland W. Co. of Hempfield Twp.)						
			67. Jacks Mountain W. Co. (Mapleton),		1		1
128	Jackson Twp., Cambria Co. (Nant-y-Glo W. Co. unine.)						
129	Jackson Twp., Lebanon Co. (Myerstown W. Co.)						
130	Jeannette (Westmoreland W. Co. of Hempfield Twp.)						
131	Jenkintown,		68. Jenkintown W. Co.,		1		1
132	Johnsonburg (W. E. Vierdon),						
133	Johnstown City (See also Jerry Alwine & Morrelleville and Cambria Boro W. Co.)		69. Johnstown W. Co. (also sup. Dale, Ferndale & Westmont Boros and Stonycreek Twp.)		1		1
				13. Jones & Laughlin Steel Co. (Woodlawn),	1		1
			70. Josephine W. Co. (Burrell Twp.),		1		1
134	Juniata,	24				1	1
135	Kingston Twp. (Shaver Bros. W. W.)						
136	Kittanning (Citizens W. Co. of Kittanning)						
137	Knoxville,	25			1		1
138	Lansdowne (Springfield W. Co.),						
139	Lansford (Panther Valley W. Co.),						
140	Laporte (Mokoma Spring W. Co.),						
141	Latrobe,		71. Latrobe W. Co.,			1	1
142	Lebanon City,	26			3	1	4
			72. Lebanon Valley Cons. W. S. Co. (N. Lebanon & S. Lebanon Twps.)		1	2	3
			73. Lehigh W. Co. (Easton),			1	1
143	Lemoyne (Riverton Cons. W. Co.),						
144	Logan Twp. (Roselawn W. Co.)						
			74. Londonderry W. Co. N. Londonderry Twp.)		1		1
145	Lower Allen Twp. (Riverton Cons. W. Co.)						
146	Lower Chichester Twp. (See New Chester W. Co.)						

WATER WORKS PERMITS—CONTINUED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905-1909.	1910.	Total.
147	Lower Merion Twp. (Springfield W. Co.)			14. Luzerne Co. Central Poor Dist. Hosp. for Insane & Almshouse (at Retreat, Newport Twp.)	2		2
148	McKeesport City,	27			2		2
149	McKees Rocks (Ohio Valley W. Co.)						
150	McSherrystown (Hanover & McSherrystown W. Co.)						
151	Macungie,	28			1		1
			75. Madera W. Co. (Bigler Twp.),		1		1
			76. Mahanoy City W. Co.,			1	1
152	Mahoning Twp. (State Hosp. for the Insane, near Danville),						
154	Manchester Twp. (York W. Co.),						
155	Manor Westmoreland W. Co. of Hempfield Twp.)						
157	Marcus Hook (Chichester W. Co.)						
156	Mapleton (Jacks Mountain W. Co.),						
158	Marianna (Incorporated in 1910),		77. Marianna W. Co. (W. Bethlehem Twp.),		1		1
			78. Marie W. Co. (Black Lick Twp.),		1		1
159	Marietta,		79. Marietta Gravity W. Co.,			1	1
160	Marple Twp. (Springfield W. Co.),						
161	Mars,	29			1		1
			80. Martindale W. Co. (Portage Boro & Portage Twp.)		1		1
162	Masontown,	30				1	1
163	Matamoras,		81. Matamoras Citizens W. Co.,		1		1
164	Mauch Chunk (Upper Mauch Chunk W. Co.)						
165	Mauch Chunk Twp. (Panther Valley W. Co.)		Mauch Chunk Twp. W. Co. (Permit 1906, Sold to Panther Valley W. Co. in 1907, which see.)				
166	Mechanicsburg,		82. Mechanicsburg Gas & W. Co.,		2		2
167	Middle Paxton Twp. (Dauphin Cons. W. S. Co.)						
168	Middletown,		83. Middletown & Swatara Cons. W. Co., (also sup. Royalton.)		1		1
169	Milford Twp. (Port Royal W Co.),						

170	Millersburg,		84. Millersburg Home W. Co.,		1		1
			85. Milnesville W. Co. (Hazle Twp.),		1		1
171	Minersville,		86. Minersville W. Co. (also sup. Cass & New Castle Twps.)		1		1
			87. Mokoma Spring W. Co. (Laporte),			1	1
172	Monessen,		88. Monessen W. Co. (also sup. Rostraver Twp.)			1	1
173	Monroe (Towanda W. Co.),						
174	Monroe Twp. (J. Calvin Boyer),						
			89. Moore W.Co. (Plum Twp.),			1	1
175	Moreland Twp. (Springfield Cons. W. Co.)		90. Moreland Spring W. Co.,			2	2
	Morganza, Cecil Twp. (See State Reform School.)						
			91. Morrellville & Cambria Boro. W. Co. (Johnstown)			1	1
176	Mountville,	31			1		1
177	Mt. Union,		92. Mt. Union W. Co.,		1		1
178	Muhlenberg Twp. (Reading Suburban W. Co.)						
			93. Myerstown W. Co. (Jackson Twp., Lebanon Co.)		1	1	2
	Nant-y-Glo Vil. (Black Lick & Jackson Twps., Cambria Co.)			15. Nant-y-Glo W. Co. (Uninc.,	1		1
179	Narbeth (Springfield W. Co.),						
			94. Natrona W. Co. (Harrison Twp.),		1		1
180	Nescopeck,		95. Nescopeck W. S. Co.,		1		1
181	Neville Twp. (Island) (Ohio Valley W. Co.)						
182	New Bethlehem (Citizens W. Co. of New Bethlehem.)						
183	New Bloomfield (Bloomfield W. & S. Co.)						
184	New Castle Twp. (Minersville W. Co.)						
			96. New Castle W. Co. (Sup. Chester City, Upland Boro and Low. Chichester Twp.)		3		3
185	New Cumberland (Riverton Cons. W. Co.)						
186	Newport,		97. Newport Home W. Co. (also sup. Oliver Twp.)		1		1
187	Newport Twp. (Luzerne Co. Central Poor District.)						
188	North Annville Twp. (See also Annville W. Co.)		98. N. Annville W. S. Co.,			1	1
189	North Braddock (Penna. W. Co.),						
190	North Charleroi (Charleroi W. Co.),						
191	North Cornwall Twp.,		99. N. Cornwall W. S. Co.,			1	1

WATER WORKS PERMITS—CONTINUED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905-1909.	1910.	Total.
192	North Coventry Twp. (Pottstown Gas & W. Co.)						
193	North East,	32			2		2
194	North Huntingdon Twp. (Westmoreland W. Co. of Hempfield Twp.)						
195	North Irwin Twp. (Westmoreland W. Co. of Hempfield Twp.)						
196	North Lebanon Twp. (Lebanon Valley Cons. W. S. Co.)						
197	North Londonderry Twp. (Londonderry W. Co.) (Gravel Hill W. S. Co.)						
198	North Versailles Twp. (E. McKeesport W. Co.)						
199	Norwich Twp. (Crosby Gas Co.),						
200	Norwood (Springfield W. Co.),						
	Oak Lane, Philadelphia. (Springfield Cons. W. Co.)						
201	Oakmont (Suburban W. Co.)		100. Ogontz W. Co. (Cheltenham Twp.),			1	1
			101. Ohio Valley W. Co. (Sup. Avalon, Ben Avon, Bellevue, Emsworth, McKees Rocks & Westview Boros, & Neville, Ross & Stowe Twps.)		1		1
202	Oliver Twp. (Newport Home W. Co.)						
203	Orbisonia,		102. Orbisonia W. Co. (Also sup. Rockhill),		1		1
	Overbrook, Philadelphia. (Springfield W. Co.)						
204	Oxford,	33				2	2
205	Paint (Windber W. & Power Co.),						
206	Paint Twp. (Windber W. & Power Co.)						
		*	103. Panther Valley W. Co. (Sup. Lansford Boro. & Mauch Chunk Twp., Carbon Co. & Coaldale B. & Rahn Twp., Schuylkill Co. and other districts in said counties. In 1907 purchased Mauch Chunk Twp. W. Co. that received permit in 1906.)		1	1	2

---

*Permit to Mauch Chunk Twp. W. Co.

207	Parkesburg,		101. Parkesburg W. Co.,		1		1
208	Patton Twp. (Penna W. Co.),						
	Paxtang Vil. (Swatara Twp.),		105. Paxtang Cons. W. Co.,		3		3
209	Penbrook (Extension W. Co.),						
210	Penn (Westmoreland W. Co. of Hempfield Twp.)						
				16. Penna. Industrial Reformatory. (Smithfield Twp., nr. Huntingdon)		1	1
			106. Pennsylvania W. Co. (Sup. Wilkinsburg Boro, Braddock, Patton, Penn & Wilkins Twps. & E. Pittsburg, Edgewood, N. Braddock, Pitcairn. Rankin, Swissvale. Trafford City, Turtle Cr. & Wilmerding Boros & Pittsburg—13th Ward.		1	1	2
211	Penn Twp., Allegheny Co., (Penna. W. Co.) (Unity W. Co.)						
212	Penn Twp., Westmoreland Co. (Westmoreland W. Co. of Hempfield Twp.)						
213	Penn Twp., York Co. (Hanover & McSherrystown W. Co.)						
214	Perkasie,		107. Perkasie W. S. Co.,		1		
215	Perry Twp. (J. Calvin Boyer),						
216	Philadelphia (Jas. S. Williams) (See also Oak Lane & Overbrook.)						
217	Pitcairn (Penna. W. Co.).						
218	Pittsburgh City (See also Penna. W. Co. for Thirteenth Ward.)	31			1		1
219	Pleasantville.	35			1		1
220	Plum Twp. (Moore W. Co.)						
221	Plymouth Twp. (Springfield Cons. W. Co.)						
222	Pottstown.		108. Pottstown Gas & W. Co. (Also sup. N. Coventry & W. Pottsgrove Twps.)		1		1
223	Portage (Martindale W. Co.),						
224	Portage Twp. (Martindale W. Co.) (Bens Creek W. Co.)						
225	Portland.		109. Portland W. Co. (also sup. Up. Mt. Bethel Twp.)		1	1	2
	Port Matilda Vil. (Worth Twp.),		110. Port Matilda W. Co.,		1		1
226	Port Royal.		111. Port Royal W. Co. (Also sup. Milford & Turbett Twps.)			1	1
227	Prospect Park (Springfield W. Co.),						
228	Punxsutawney,		112. Punxsutawney W. Co. (Also sup. Big Run.)		1		1
229	Quarryville,		113. Quarryville W. Co.,			2	2
230	Radnor Twp. (Springfield Cons. W. Co.)						
231	Rahn Twp. (Panther Valley W. Co.)						

WATER WORKS PERMITS—CONTINUED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905 1909.	1910.	Total.
232	Ramey,		114. Ramey W. Co. (Also sup. Bigler Twp.)		1		1
233	Rankin (Penna. W. Co.),						
243	Rayburn Twp. (Citizens W. Co. of Kittanning.						
235	Reade Twp. (Blandburg W. Co.),						
236	Reading City,	36			2		2
			115. Reading Suburban W. Co. (Muhlenberg Twp.)		1		1
237	Reilly Twp. (Blackwood W. Co.),						
	Retreat Vil. (Luzerne Co. Central Poor District.)						
238	Richland Twp., Clarion Co. (Foxburg W. W. Co.)						
239	Richland Twp., Cambria Co. (Windber W. & P. Co.)						
240	Ridgway,	37			3		3
241	Ridley Park (Springfield W. Co.),						
242	Ridley Twp. (Springfield W. Co.),						
			116. Ridley W. Co. (Eddystone),		2		2
243	Rimersburg,	38				1	1
244	Ringtown,		117. Ringtown Spring W. S. Co.,			1	1
			118. Riverton Cons. W. Co. (Sup. Camp Hill, Lemoyne, New Cumberland & Wormleysburg Boros & E. Pennsboro, Fairview & Low. Allen Twps.)		4		4
245	Rockhill (Orbisonia W. Co.),						
246	Rockledge (Springfield Cons. W. Co.)						
			119. Roselawn W. Co. (Logan Twp.),			1	1
247	Rose Twp. (Brookville W. Co.),						
248	Ross Twp. (Ohio Valley W. Co.),						
249	Rostraver Twp. (Monessen W. Co.),						
250	Roulette Twp.,		120. Roulette W. Co.,		1		1
251	Royalton (Middletown & Swartara Cons. W. Co.)						
252	Rural Valley,	39				1	1
			121. Rutherford Hts. W. S. Co. (Swatara Twp.)		4		4

253	St. Marys,		122. St. Marys W. Co.,		1		1
254	Salem Twp. (W. Salem W. S. Co.),						
255	Sankertown (Cresson W. Co.),						
256	Saylorsburg (Hamilton W. Co.),						
257	Sayre (Bradford County W. Co.),						
258	Scalp Level (Windber W. & Power Co.)						
259	Scranton City,		123. Scranton Gas & W. Co. (Also sup. Dickson City Boro & Throop.)		1		1
260	Schuylkill Haven,		124. Schuylkill Haven Gas & W. Co. (Also sup. Cressona.)			2	2
261	Schuylkill Twp. (Springfield Cons. W. Co.)						
262	Shade Twp. (Windber W. & P. Co.),						
263	Sharon Hill (Springfield W. Co.),						
				17. Shaver Bros. Water Works (Kingston Twp.)		1	1
	Shawnee Vil. (Smithfield Twp., Monroe Co.)		125. Shawnee W. S. Co.,		1		1
264	Sheffield Twp.,		126. Sheffield W. Co.,		1		1
265	Shinglehouse,			18. Shinglehouse W. Co.,		1	1
266	Shiremanstown,		127. Shiremanstown W. Co.,		2		2
267	Shrewsbury,	40				1	1
268	Slippery Rock,	41			1		1
269	Smithfield Twp., Huntingdon Co. (Penna. Industrial Reformatory.)						
270	Smithfield Twp., Monroe Co. (Shawnee W. S. Co.)						
				19. Somerset Co. Poor Directors (Home in Somerset Twp.)	1		1
271	Somerset Twp. (Gladehurst W. Co.) (See also Somerset Co. Poor Directors.)						
272	South Annville Twp. (See also Annville W. Co.)		128. S. Annville W. Sup. Co.,			1	1
273	South Bethlehem, Armstrong Co. (Citizens W. Co. of New Bethlehem.)						
			129. South Bradford W. Co. (Bradford Twp.)		1		1
			130. South Easton W. Co. (Easton),		1		1
274	South Lebanon Twp. (Lebanon Valley Cons. W. S. Co.)						
275	South Middletown Twp. (J. C. Bucher.)						
276	South Renovo,	42			1		1
277	Spangler (Barnesboro W. Co.),				1		1
	Spring City (See State Inst. for Feeble Minded & Epileptic.)						

WATER WORKS PERMITS—CONTINUED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905-1909.	1910.	Total.
278	Springdale,		131. Springdale W. Co.,		1		1
279	Springetsbury Twp. (York W. Co.),		132. Springfield Cons. W. Co. (Supplies Radnor Twp., Dela. Co., Easttown. Schuylkill, Tredyffrin, W. Whiteland, Whitemarsh & Willistown Twps., Chester Co., Abington, Cheltenham, Moreland, Plymouth, Up. Dublin & Up. Merion Twps. & Conshohocken & Rockledge Bs., Montg. Co. & Oak Lane, Phila.)		1		1
			133. Springfield W. Co. (Supplies Aldan, Clifton Hts., Collingdale, Colwyn, Darby, Eddystone, Glenolden, Lansdowne, Norwood, Prospect Park, Ridley Park. Sharon Hill, & Yeadon Boros, & Darby, Haverford, Marple, Ridley, Tinicum & Up. Darby Twps., Delaware Co., Low. Merion Twp. & Narberth Boro, Montg. Co., & Overbrook, Phila.)		1		1
280	Spring Garden Twp. (York W. Co.),						
281	State College (See also University W. Co.)		134. State College W. Co., (Also sup. Harris Twp.)		1		1
				20. State Hosp. for Insane (Mahoning Twp., nr. Danville.)	3		3
				21. State Inst. for Feeble Minded and Epileptic (E. Vincent Twp., nr. Spring City.)	1		1
				22. State Reform School (Cecil twp. nr. Morganza.)	1		1
282	Steelton,	43			3		3
				23. Stone, Raymond D. (Bridgeton Twp.)		1	1
283	Stonycreek Twp. (Johnstown W. Co.)						
284	Stowe Twp. (Ohio Valley W. Co.),						
285	Stoystown,		135. Stoystown W. Co.,		1		1
286	Stroudsburg,		136. Stroudsburg W. Sup. Co.,			1	1
			137. Suburban W. Co. of Allegheny County, Pa. (Oakland & Varona.)			2	2

287	Sugar Creek Twp. (Venango Oil & Land Co.)						
288	Sunbury,		138. Sunbury W. Co.,			1	1
289	Susquehanna Twp. (See also Dauphin Cons. W. S. Co.)		139. Susquehanna Twp. W. Co.,		1		1
290	Swatara Twp. (Rutherford Hts. W. S. Co.) (Paxtang Cons. W. Co.) (Eastmere W. Co.) Beaver Creek W. Co.)						
291	Swissvale (Penna W. Co.),						
292	Tamaqua,	44			1		1
293	Tarentum,		140. Tarentum W. Co. (Also sup. Brackenridge Boro, East Deer & Harrison Twps.)		1		1
294	Taylor Twp. (W. Pittsburg W. Co.),						
295	Thompsontown (H. W. Wickersham)						
296	Throop (Scranton G. & W. Co.), Co.)						
297	Tinicum Twp. (Springfield W. Co.),						
298	Towanda,		141. Towanda W. Co. (also sup. Monroe.)		1		1
299	Trafford City (Boro) (Penna. W. Co.)						
300	Tredyffrin Twp. (Springfield Cons. W. Co.)						
301	Tremont,		142. Tremont W. & Gas Co.,			1	1
			143. Trevorton W. S. Co. (Zerbe Twp.),		1		1
			144. Trevose Manor Spr. W. Co. (Bensalem Twp.)		1		1
			145. Trout Run W. Co. (Duncannon),		1		1
302	Turbett Twp. (Port Royal W. Co.),						
303	Turtle Creek (Penna. W. Co.),						
304	Tyrone (Bald Eagle W. Co.),						
305	Uniontown,		146. Uniontown W. Co.,			1	1
			147. Unity W. Co. (Penn Twp.),			1	1
			148. University W. Co. (Sup. College & Ferguson Twps. & State College B.)		1		1
306	Upland (New Chester W. Co.),						
307	Upper Darby Twp. (Springfield W. Co.)						
308	Upper Dublin Twp. (Springfield Cons. W. Co.)						
			149. Upper Mauch Chunk W. Co. (Mauch Chunk.)		1		1
309	Upper Merion Twp. (Springfield Cons. W. Co.)						
310	Upper Mt. Bethel Twp. (Portland W. Co.)						
				24. Venango Oil & Land Co. (Sugar Cr. Twp.)		1	1
			150. Venango W. Co. (Purchased by city of Franklin.)		8		8

WATER WORKS PERMITS—CONTINUED.

	Place.	Municipal.	Water Company.	Miscellaneous.	1905-1909	1910.	Total.
311	Verona (Suburban W. Co.),						
312	Wall (East McKeesport W. Co.),						
313	Warren,		151. Warren Co.,		2		2
314	Washington Twp. (Blue Ridge W. S. Co.)						
315	Waterford,		152. Waterford W. Co.,		1		1
316	Weatherly,		153. Weatherly W. Co.,			1	1
			154. Weldon W. Co. (Abington Twp.),			1	1
317	Wellsboro,		155. Wellsboro W. Co.,		2		2
318	West Berwick,		156. West Berwick W. S. Co.,		1		1
319	West Bethlehem Twp. (Marianna W. Co.)						
320	West Chester,	45				1	1
321	West Hazleton (Diamond W. Co.),						
			157. West Houtzdale W. Co. (Woodward Tp. & Brisbin Boro.)		1		1
322	West Manchester Twp. (York W. Co.)						
323	Westmont (Johnstown W. Co.),						
			158. Westmoreland W. Co. of Hempfield Twp. (One of 8 companies operating systems supplying Greensburg (part), Hempfield, N. Huntingdon & Penn Twps., & Irwin, Jeannette, Manor, N. Irwin, Penn & Youngwood Boros.)		1		1
	West Pittsburg Vil. (Taylor Twp.),		159. West Pittsburg W. Co.,		1	1	2
324	West Pottsgrove Twp. (Pottstown Gas & W. Co.)						
			160. West Salem W. S. Co. (Salem Twp.),		1		1
325	West Whiteland Twp. (Springfield Cons. W. Co.)						
326	Westview (Ohio Valley Co.),						
327	Whitemarsh Twp. (Springfield Cons. W. Co.)						
328	Wickboro (Citizens W. Co. of Kittanning.)						

				25. Wickersham, H. W., (Thompsontown.)	--------	1	1
				26. Williams, Jas. S., (Phila.),	1	--------	1
329	Williamsport City (See also Citizens W. & Gas Co. of W.)	--------	161. Williamsport W. Co.,	--------	--------	1	1
330	Wilkinsburg (Penna W. Co.),	--------	--------	--------	--------	--------	--------
331	Wilkins Twp. (Penna. W. Co.),	--------	--------	--------	--------	--------	--------
332	Wilmerding (E. McKeesport W. Co.) (Penna. W. Co.)	--------	--------	--------	--------	--------	--------
333	Willistown Twp. (Springfield Cons. W. Co.)	--------	--------	--------	--------	--------	--------
334	Windber,	--------	162. Windber Water & Power Co. (Also sup. Paint & Scalp Level Boros & Paint, Richland & Shade Twps.)	--------	2	--------	2
335	Woodlawn (Jones & Laughlin Steel Co.)	--------	--------	--------	--------	--------	--------
336	Woodward Twp. (West Houtzdale W. Co.)	--------	--------	--------	--------	--------	--------
337	Wormleysburg (Riverton Cons. W. Co.)	--------	--------	--------	--------	--------	--------
338	Worth Twp. (Port Matilda W. Co.),	--------	--------	--------	--------	--------	--------
339	Wrightsville,	--------	163. Wrightsville W. S. Co.,	--------	1	--------	1
340	Wyalusing,	--------	164. Wyalusing W. Co.,	--------	--------	1	1
341	Yeadon (Springfield W. Co.),	--------	--------	--------	--------	--------	--------
342	Yoe,	--------	165. Yoe W. Co.,	--------	1	--------	1
343	York City,	--------	166. York W. Co. (also sup. Hellam, Manchester, Springetsbury, Spring Garden & W. Manchester Twps.)	--------	1	1	2
344	Youngwood (Westmoreland W. Co. of Hempfield Twp.)	--------	--------	--------	--------	--------	--------
345	Zerbe Twp. (Trevorton W. S. Co.),	--------	--------	--------	--------	--------	--------
				27. Zierdon, W. E., (Johnsonburg),	1	--------	1

Of the 238 water works systems, the subjects of permits or decrees, (and it should be understood that every permit is a decree, but that every decree is not necessarily a permit), 65 systems obtain their sources of supply from ground water only, 102 from surface sources only, and 71 from both ground and surface water sources. In the following table are given the names of the owners of the water works systems, the subject of permits or decrees, that secure, or propose to secure, their sources of supply from ground waters only:

Water Works Systems Supplied from GROUND WATER SOURCES ONLY Which Have Been the Subjects of PERMITS OR DECREES.

	Water Works System.	Ground Water Sources.	
		Wells.	Springs
1.	Albion borough,	--------	x
2.	Alwine, Jerry,	--------	x
3.	Annville Water Co.,	x	x
4.	Austin borough,	--------	x
5.	Avonmore borough,	x	--------
6.	Baden borough,	x	--------
7.	Bethlehem borough,	x	--------
8.	Biglerville Water Co.,	--------	x
9.	Bloomfield Water and Sewer Co.,	--------	x
10.	Blue Ridge Water Supply Co.,	x	--------
11.	Boyer, J. Calvin (Perry township),	--------	x
12.	Brickel, B. W.,	x	--------
13.	Bucher, J. C.,	x	--------
14.	Catasauqua borough,	x	--------
15.	Conneautville borough,	--------	x
16.	Conway borough,	x	--------
17.	Crosby Gas Co.,	--------	x
18.	Curtis, J. G., Leather Co.,	--------	x
19.	Dallas Water Co.,	--------	x
20.	Dillsburg Water Co.,	--------	x
21.	Dover borough,	x	--------
22.	East Brady Water Works Co.,	x*	x
23.	Edinboro borough,	x	--------
24.	Farwell, Absalom,	--------	x
25.	Gladehurst Water Co.,	--------	x
26.	Greencastle borough,	--------	x
27.	Hellam Water Co.,	--------	x
28.	Hershey, M. S.,	--------	x
29.	Heidelberg Water Co.,	--------	x
30.	Jones & Laughlin Steel Co.,	x	--------
31.	Josephine Water Co.,	x	--------
32.	Knoxville borough,	x	x
33.	Madera Water Co.,	--------	x
34.	Mars borough,	x	--------
35.	Matamoras Citizens Water Co.,	x	--------
36	Mountville borough,	x	x
37	Ohio Valley Water Co.,	x	--------
38.	Orbisonia Water Co.,	--------	x
39.	Oxford borough,	x	--------
40.	Parkesburg Water Co.,	x	x
41.	Paxtang Consolidated Water Co.,	--------	x
42.	Perkasie Water Supply Co.,	--------	x
43.	Pleasantville borough,	x	--------
44.	Port Matilda Water Co.,	--------	x
45.	Port Royal Water Co.,	--------	x
46.	Rimersburg borough,	x	--------
47.	Ringtown Spring Water Supply Co.,	x	--------
48.	Roselawn Water Co.,	x	--------
49.	Rural Valley borough,	x	--------
50	Shawnee Water Supply Co.,	--------	x
51.	Shinglehouse Water Co.,	x	x
52.	Shrewsbury borough,	x	x
53.	Slippery Rock borough,	x	--------
54.	Somerset county poor directors,	x	x
55.	South Bradford Water Co.,	--------	x
56.	South Easton Water Co.,	x	x
57.	Springdale Water Co.,	x	--------
58.	Stone, Raymond D.,	--------	x
59.	Stoystown Water Co.,	x	--------
60.	Trevorton Water Supply Co.,	--------	x
61.	Trevose Manor Spring Water Co.,	--------	x
62.	Venango Oil and Land Co.,	--------	x
63.	Waterford Water Co.,	--------	x
64.	Williams, J. S.,	x	--------
65.	Zierdon, W. E.,	x	--------

*Auxiliary.

It appears that the ground water sources, sub-divided, are as follows:

Wells only,	26
Springs only,	30
Wells and springs,	9
Total	65

The water works systems that have been made the subject of permits or decrees, which systems obtain, or propose to obtain, their supplies from surface waters only, are given in the following table:

Water Works Systems Supplied From SURFACE WATERS ONLY Which Have Been the Subject of PERMITS OR DECREES.

Water Works System.	
1. Albion Water Co.,	Not built.
2. Bald Eagle Water Co.,	
3. Barnesboro Water Co.,	Sells to another company.
4. Beaver Creek Water Co.,	
5. Bens Creek Water Co.,	
6. Blandburg Water Co.,	
7. Blossburg Water Co.,	
8. Boalsburg Water Co.,	
9. Boyer, J. Calvin (Monroe Twp.),	
10. Bradford County Water Co.,	Not built.
11. Bright Run Water Co.,	
12. Bristol borough,	
13. Bristol Water Co.,	
14. Brockway Crystal Water Co.,	
15. Brookville Water Co.,	
16. Butler Water Co.,	
17. Chambersburg borough,	
18. Charleroi Water Co.,	
19. Chichester Water Co.,	Supply from New Chester Water Co.
20. Citizens Water and Gas Co., of Williamsport.	
21. Citizens Water Co. of New Bethlehem,	
22. Clearfield Water Co.,	
23. Clymer Water Co.,	
24. Cresson borough,	Supply from Summit Water Supply Co.
25. Danville State Hospital,	
26. Dingmans Ferry Water Co.,	
27. Donora Water Co.,	Supply from Monessen Water Co.
28. DuBois borough,	
29. Eastmere Water Co.,	Supply from Rutherford Heights Water Supply Co.
30. Edgemont Water Co.,	Supply from New Chester Water Co.
31. Ellwood Water Co.,	
32. Emporium Water Co.,	
33. Extension Water Co.,	Supply from Susquehanna Township Water Co.
34. Fairchance borough,	Supply from water company.
35. Fairview Water Co.,	Not built.
36. Falls Creek borough,	
37. Freeport Water Co.,	
38. Gilberton-Schuylkill Water Co.,	Supply from Bright Run Water Co.
39. Girardville Water Co.,	Supply from Bright Run Water Co.
40. Glen Brook Water Co.,	Not built.
41. Gravel Hill Water Supply Co.,	Supply from Lebanon Valley Cons. Water Supply Co.
42. Hallstead Water Co.,	Supplies another company.
43. Harrisburg city,	
44. Honesdale Consolidated Water Co.,	Sells to other companies.
45. Horner, H. M.,	
46. Hummelstown Cons. Water Co.,	Sells to another company.
47. Huntingdon Water Supply Co.,	
48. Johnstown Water Co.,	Emergency supply from another company.
49. Juniata borough,	
50. Latrobe Water Co.,	
51. Lebanon Valley Consolidated Water Supply Co.	Supplies other companies.
52. McKeesport city,	
53. Marianna Water Co.,	
54. Marietta Gravity Water Co.,	
55. Mario Water Co.,	
56. Martindale Water Co.,	
57. Masontown borough Mauch Chunk Twp. Water Co.	Sold to Panther Valley Water Co.
58. Middletown and Swatara Cons. Water Co.	
59. Minersville Water Co.,	

SURFACE WATER ONLY—Continued.

Water-Works System.	
60. Monessen Water Co.,	Supplies Donora Water Co.
61. Moore Water Co.,	Supply from Suburban Water Co. of Allegheny county, Pa.
62. Mt. Union Water Co.,	
63. Nant-y-Glo Water Co.,	
64. New Chester Water Co.,	Supplies other companies.
65. North Annville Water Supply Co.,	Supply from Lebanon Valley Cons. Water Supply Co.
66. North Cornwall Water Supply Co.,	Supply from Lebanon Valley Cons. Water Supply Co.
67. Panther Valley Water Co.,	Purchased Mauch Chunk Township Water Co.
68. Pennsylvania Water Co.,	Sells to other companies.
69. Pittsburgh city,	
70. Portland Water Co.,	
71. Pottstown Gas and Water Co.,	
72. Reading Suburban Water Co.,	Supply from Reading city.
73. Ridgway borough,	
74. Ridley Water Co.,	Supply from New Chester Water Co.
75. Riverton Township Consolidated Water Co.	Sells to another company.
76. Rutherford Heights Water Supply Co.,	Supply from Hummelstown Cons. Water Co.
77. Schuylkill Haven Gas and Water Co.,	
78. Scranton Gas and Water Co.,	Sells to other companies.
79. Sheffield Water Co.,	
80. Shiremanstown Water Co.,	Supply from Riverton Cons. Water Co.
81. South Annville Water Supply Co.,	Supply from Lebanon Valley Cons. Water Supply Co.
82. South Renovo borough,	
83. Springfield Consolidated Water Co.,	Supplies other companies.
84. Springfield Water Co.,	Supplies other companies.
85. State College Water Co.,	Sells to another company.
86. Steelton borough,	
87. Suburban Water Co. of Allegheny county, Pa.	Supplies other companies.
88. Sunbury Water Co.,	
89. Susquehanna Township Water Co.,	Supply from Rutherford Heights Water Supply Co.
90. Tamaqua borough,	
91. Tarentum Water Co.,	
92. Uniontown Water Co.,	
93. Unity Water Co.,	Supply from Suburban Water Co. of Allegheny county, Pa.
94. University Water Co.,	Buys of one and sells to another company.
95. Warren Water Co.,	
96. Weatherly Water Co.,	
97. West Chester borough,	
98. Westmoreland Water Co. of Hempfield township.	Co-operates with other water companies.
99. West Pittsburg Water Co.,	
100. Windber Water and Power Co.,	Supplies other companies.
101. Wyalusing Water Co.,	
102. York Water Co.,	Supplies other companies.

The water works systems which are supplied from both surface and ground water sources that have been made the subjects of permits or decrees are named in the following table:

Water Works Systems Supplied From SURFACE AND GROUND WATER SOURCES Made the Subjects of PERMITS OR DECREES.

Water Works System	Wells.	Springs.	Surface.
1. Arendtsville Water Co.,	----------	x	x
2. Berwick Water Co.,	----------	x	x
3. Blackwood Water Co.,	----------	x	x
4. Bradford city,	x	----------	x
5. Briar Creek Water Supply Co.,	----------	x	x
6. Cambridge Springs borough,	x	----------	x
7. Catawissa Water Co.,	x	x	x
8. Citizens Water Co. of Gordon,	----------	x	x
9. Citizens Water Co. of Kittanning,	x	x	x
10. Clarion Water Co.,	x	----------	x
11. Cresson Water Co.,	x	x	x*
12. Dauphin Cons. Water Supply Co.,	x	----------	x

*Proposed.

SURFACE AND GROUND WATER—Continued.

Water Works System	Wells.	Springs.	Surface.
13. Denver borough,	----------	x	x
14. Diamond Water Co.,	x	x	x
15. Doylestown borough,	x	x	x†
16. DuBois, John E.,	----------	x	x
17. Eagles Mere Water Co.,	x	----------	x‡
18. East Mckeesport Water Co.,	----------	x	x§
19. Emlenton Water Co.,	x	----------	x
20. Foxburg Water Works Co.,	x	----------	x
Franklin (has purchased Venango Water Co.)			
21. Galeton-Eldred Water Co.,	----------	x	x
22. Glen Rock borough,	x	x	x
23. Hamilton Water Co.,	----------	x	x
24. Hanover & McSherrystown Water Co.,	----------	x†	x
25. Hazleton Water Co.,	x	----------	x
26. Houtzdale Water Co.,	x	----------	x
27. Huntingdon State Reformatory,	----------	x	x‡
28. Jacks Mountain Water Co.,	----------	x	x
29. Jenkintown Water Co., (From Moreland Spring Water Co.)	x	x	x
30. Lebanon city,	x‡	----------	x
31. Lehigh Water Co.,	----------	x	x
32. Londonderry Water Co.,	x	x	x
33. Luzerne County Central Poor District,	x	----------	x
34. Macungie borough,	----------	x	x
35. Mahanoy City Water Co.,	x	----------	x
36. Mechanicsburg Gas and Water Co.,	----------	x	x
37. Millersburg Home Water Co.,	x	x	x
38. Milnesville Water Co.,	----------	x	x
39. Mckoma Spring Water Co.,	----------	x	x
40. Moreland Spring Water Co.,	x	x	x
41. Morganza State School,	x	x	x
42. Morrellville and Cambria Borough Water Co.,	x	----------	x
43. Myerstown Water Co.,	----------	x	x
44. Natrona Water Co.,	----------	x	x
45. Nescopeck Water Supply Co.,	----------	x	x
46. Newport Home Water Co.,	x	x	x
47. North East borough,	----------	x	x
48. Ogontz Water Co. (from Moreland Spring Water Co.),	x	x	x
49. Punxsutawney Water Co.,	x‡	----------	x
50. Quarryville Water Co.,	----------	x	x
51. Ramey Water Co.,	x	----------	x
52. Reading city,	----------	x	x
53. Roulette Water Co.,	----------	x	x
54. St. Marys Water Co.,	x	----------	x
55. Shaver Brothers,	x	----------	x
56. Spring City State Hospital,	x	----------	x
57. Stroudsburg Water Supply Co.,	----------	x	x
58. Towanda Water Co.,	----------	x	x
59. Tremont Water and Gas Co.,	----------	x	x
60. Trout Run Water Co.,	----------	x	x
61. Upper Mauch Chunk Water Co.,	----------	x	x
62. Venango Water Co. (Sold to Franklin),	x	x	x
63. Weldon Water Co. (from Moreland Spring Water Co.),	x	x	x
64. Wellsboro Water Co.,	----------	x	x
65. West Berwick Water Supply Co.,	----------	x	x
66. West Houtzdale Water Co.,	x	----------	x
67. West Salem Water Supply Co.,	----------	x	x
68. Wickersham, H. W.,	----------	x	x
69. Williamsport Water Co.,	x†	----------	x
70. Wrightsville Water Supply Co.,	----------	x	x
71. Yoe Water Co.,	----------	x	x

*Proposed. †Emergency. ‡Auxiliary. §From Pa. W. Co.

Summary of Sources.

There are 136 water works systems having ground water sources in whole or in part and 173 systems having surface water sources in whole or in part.

Of the 136 instances where the supply is ground water in whole or in part it is obtained from wells in 45 cases, from springs in 66 cases, and from wells and springs in 25 cases.

In 3 instances only do the surface waters come from natural bodies of water or lakes, namely, the Honesdale Consolidated Water Company, the Myerstown Water Co., Jackson Township, Lebanon County, and the Eagles Mere Water Company.

In reference to filter plants, 57 water works systems operating filter plants have been made the subjects of permits or decrees. These 57 water works systems comprise a total of 62 plants, the permits to Reading City covering four plants, the permits to the Springfield Companies covering four plants, and the first filter design proposed by the Schuylkill Haven Gas and Water Company was disapproved. One old crib filter has been abandoned. Thus 63 filter designs in all have been examined and passed upon as appears from the following table. In addition 10 water works systems have received permits or decrees relative to the furnishing of filtered water from the plants of other companies.

WATER FILTERS MADE THE SUBJECT OF PERMITS OR DECREES.

Water Works.	Type of Filter Plant.			
		Mechanical.		
	Slow Sand.	Gravity.	Pressure.	Miscellaneous.
1. Albion W. Co. (Water works not built),				Vertical not built.
2. Beaver Creek Water Co..		New.		
3. Bristol Borough,		New.		
4. Bristol Water Company,		New.		
5. Brookville Water Company,		New.		
6. Butler Water Company,		Old.		
7. Cambridge Springs Borough,		New.		
8. Charleroi Water Company,		New.		Old crib.
9. Citizens W. Co. of Kittanning (Sold to Armstrong W. Co.)				Old crib not used.
10. Citizens Water Co. of New Bethlehem,		Addition.		
11. Clarion Water Company,		Old.		
12. Clymer Water Company of Indiana,		New.		
13. Danville State Hospital,		Addition.		
14. Dauphin Con. W. Sup. Co.,		New.		
Donora W. Co (Supply for Monessen W. Co.)				
15. Eagles Mere W. Co.,			New.	
16. Ellwood Water Company,		New.		
Franklin has purchased Venango W. Co.,				
17. Freeport W. Co.,		New.		
Gravel Hill W. Sup. Co., (from Leb. Val. Con. W. Sup. Co.)				
18. Hanover & McSherrystown W. Co.,				Old vertical.
19. Harrisburg city,		Old		
20. Hummelstown Con. W. Co.,		New		
21. Huntingdon W. Sup. Co.,				Addition.
Jenkintown W. Co. (Supply from Moreland Spring Water Company.)				Semi slow.
22. Lebanon city,		New, not built.		
23. Lebanon Valley Consolidated W. Supply Co.,		New.		
24. Lehigh Water Company,				Old crib.
25. McKeesport city,		New.		
26. Masontown borough,		New.		
27. Mechanicsburg Gas & W. Co.,		New.		
28. Middletown & Swatara Consol. W. Co.,		New.		
29. Monessen Water Company,		Addition.		
Moore Water Company (Supply from Sub. W. Co. of Allegheny Co. Pa.)				
30. Moreland Spring W. Co.,		New.		
31. Morganza State School,	New.			
32. Myerstown Water Company,			New.	
33. Natrona W. Co.,		New.		
34. New Chester W. Co.,		Addition.		
35. Newport Home W. Co.,		New.		
North Annville W. Sup. Co. (Supply from Leb. V. W. Sup. Co.)				
36. North East borough,			New.	
North Cornwall W. Sup. Co. (Supply from Leb. V. Con. W. Sup. Co.)				
Ogontz W. Co. (Supply from Moreland Spring Water Co)				
37. Pennsylvania W. Co.,		New.		Old Crib.
38. Pittsburgh city,	Addition.			Old crib.
39. Pottstown Gas & W. Co.,		New.		
40. Punxsutawney W. Co.,			New.	
41. Quarryville W. Co.,		New		
42. Reading city,	2 old. 2 new.			
43. Ridgway borough,		New.		

WATER FILTERS, ETC.—Continued.

Water Works.	Type of Filter Plant.			
	Slow Sand.	Mechanical.		Miscellaneous.
		Gravity.	Pressure.	
44. Riverton Consol. W. Co.,		New.		
45. Schuylkill Haven Gas & Water Co.,		New.	New, disapproved.	
46. Scranton Gas & Water Co.,		New.		
South Annville W. S. Co. Con. (Sup. from Leb. Val. Water Supply Co.)				
47. Spring City State Hospital (Sup. from Home W. Co. of Royersford.)		Old.		
48. Springfield Cons. W. Co also operates			New.	
N. Springfield W. Co.	Old.	Old.		
49. Springfield W. Co.,			Old.	
50. Steelton borough,	New.			New scrubbers
51. Sunbury W. Co.,		Old.		
52. Suburban W. Co. of Allegheny Co., Pa.,				Old crib.
53. Tarentum W. Co.,		New.		
Unity W. Co. (Supply from Sub. W. Co. of Allegheny Co. Pa.)				
54. Venango Water Co. (Sold to Franklin City),		New.		
55. Warren Water Company,		New.		
Weldon Water Co. (Supply from Moreland Spring W. Co.)				
56. West Pittsburgh W. Co.,		New.		
57. York Water Company,		Addition.		

SUMMARY OF FILTERS MADE THE SUBJECT OF PERMITS OR DECREES

Type Plant.	Old Plants.		New plants.	Not built.	Abandoned.	Total.
	Unchanged.	Extended.				
Slow Sand,	3	1	4			8
Mechanical Gravity,	6	5	30	1		42
Mechanical Pressure,	1		5	1		7
Semi-slow,		1				1
Crib Only,	2				1	3
Vertical Strainer,	1			1		2
All Types,	13	7	39	3	1	63

From the above table it appears that the mechanical or rapid type of filter predominates in favor and further, that the unreliability of the old cribs and strainers to furnish a safe supply from polluted sources is being recognized.

SEWERAGE

14. SEWERAGE AND SEWAGE DISPOSAL PERMITS AND DECREES ISSUED BY THE COMMISSIONER OF HEALTH UP TO JANUARY 1ST, 1911.

The issuing of sewerage and sewage disposal permits and decrees has been done under Act 182 of 1905. This law is a distinct departure in Pennsylvania State Medicine, in that it provides for State prevention of water-borne diseases. Formerly the powers committed by statute to the State Board of Health relative to regulations tending to limit the spread of infection by water carriage were advisory only. It was within the Board's sphere and duty at all times to recommend the local authorities having the usual powers in matters relating to the preservation of public health, the adoption of effective sanitary and preventive regulations and measures in anticipation of possible further epidemics.

The policy of limiting the State Department of Health to powers of an advisory character only, until the actual presence of an epidemic threatens everybody in the community, so vividly shown to be suicidal in the extreme at Butler, in the memorable epidemic of 1903-04, ceased with the enactment of the law of 1905. In the prosecution of the work under this new law, precedents have had to be established. It has been pioneer effort.

Sewerage is defined in the Act as "any substance that contains any of the wastes products or excrementitious or otther discharges from the bodies of human beings or animals." Slops, sink and wash water come within the meaning of the term. The prevailing idea that laundry water and drainage from bath-tubs is not sewage is gradually being dispelled; but not without some educational effort in making clear that such waters very frequently contain pathogenic poison, and that they are often discharged onto the surface of the ground near springs and wells, or into street gutters, and thence to streams used below as sources of public water supply. Some manufacturing wastes are not sewage as above defined, but if a menace to public health, they are subject to regulation at the discretion of the Commissioner of Health.

The law stipulates that no person, corporation or municipality shall place or permit to be placed or discharge or permit to flow into any of the waters of the State any sewage except as specially provided; but the Act does not apply to waters pumped or flowing from coal mines or tanneries. Neither does it prevent the discharge or sewage from any public sewer system owned and maintained by a municipality, provided such sewer system was in operation and was discharging sewage into any State waters at the time of the passage of the Act. The exception noted, however, does not permit the discharge of sewage from a sewer system extended subsequent to the passage of the Act. A copy of the law has been sent to every municipality.

Therefore, it is understood that so long as a municipal sewer system in use before April 22nd, 1905, be not extended, the law is not applicable and the sewage therefrom may continue to defile the public water supply. What constitutes an extension has been the subject of considerable contention by local officials. A sewer system must, in the course of events, be extended. Department officer and agents have been instructed that evidently the intent of the law is to bring, as soon as possible, all municipal sewer systems under State regulation and control, to the end that the purity of the waters of the State for the protection of the public health be accomplished.

Unapproved sewer extension to an existing sewer outlet whereby the volume of filth discharge into a stream is quadrupled would defeat the object of the law and be contrary to the letter thereof. It is understood that the State officials have determined that it is the principle involved which shall control and not the length of the sewer extension.

The law further provides that upon application duly made to the Commissioner of Health by public authorities having by law charge of a sewer system of any municipality, the Governor, Attorney General and the Commissioner of Health, shall consider the case and whenever it is their unanimous opinion that the general interest of the public health would be subserved thereby, the Commissioner of Health may issue a permit for the discharge of sewage from such public sewer system into any of the waters of the State and may stipulate in the permit the conditions, on which discharge will be permittetd. The permit before being operative must be recorded in the office of the Recorder of Deeds for the county wherein the outlet for the sewer system is located.

As understood, the policy inaugurated is to bring about the abandonment of streams as carriers of sewage. All sewage must finally cease to be discharged, untreated, into any waters used subsequently for drinking purposes.

In a municipality the limit of whose borrowing capacity has been about reached, the erection of sewage purification works for the present is thus prevented. However, it is the policy of the State, set forth in the permit, to require this municipality, or any other, in extending its sewers, to make such extensions in compliance with plans contemplating treatment works in the future.

It also appears by what follows that a town should obviate the making of a petition every time a petty sewer extension is contemplated, by the submission in the first instance of a general application for sewer extension, involving the question once for all of State policy for that particular municipality. State approval under these circumstances implies careful consideration of the problems involved. The principal one relates to the disposition of sewage.

A private corporation duly chartered by the State, and to which local authorities have granted a franchise for the construction, operation and maintenance of a public sewer system, is considered to be classed with the municipal corporation to the extent that plans must be filed and extension approved. All other private corporations and companies and individuals that at the time of the passage of the Act, were discharging sewage into any of the waters of the State, may continue such discharge unless otherwise ordered. In a borough the remedy for the sources of pollution may be connection with a public sewerage system.

The student of the permits may note that one feature is based on the proposition that it is not practicable to treat large volumes of mingled sewage and storm water, owing to the prohibitive cost. Usually it is cheaper and better to build separate sewers for sanitary household drainage and to provide other channels for the removal of rain water.

Another feature is based on the proposition that efficiency and economy in preserving the purity of streams for the public protection dictate that sewers shall be built to conform to a comprehensive plan. Municipalities are learning that patchwork methods are bound to cause trouble, expensive alterations and repairs, and that those towns which have employed competent consulting engineers to lay out comprehensive systems and have thereafter conformed to the plan in construction, have usually found such a course to be profitable.

During the year 111 sewerage permits and decrees have been issued and it should be noted that, as in the case of water works, every permit is a decree but every decree is not a permit. These permits and decrees include 69 permits for the temporary discharge of sewage untreated into State waters; 14 approvals of plans for sewage treatment works, in addition to those approved in temporary permits; 5 decrees rejecting sewerage plans or withholding approval thereof until sewage treatment plans are prepared; 2 decrees rejecting sewage treatment plans or withholding approval because of lack of sufficient detail: and 19 decrees requiring the preparation of sewage treatment plans to be taken up at once. A special permit was issued to the borough of Washington to petty sewer extensions to its system discharging to the sewage treatment works already approved by the Department. A permit was issued to Summit Hill approving plans for a pump station to raise the sewage from a small district to a temporary outlet already approved.

Of the 69 permits for the temporary discharge of sewage untreated into State waters:

Two (2) expire within one month and require the submission of sewage disposal plans, namely, those issued to Punxsutawney and South Bethlehem (Northampton County):

Six (6) expire in six months and require the submission of sewage disposal plans within that time, namely, those issued to Carbondale, Glassport, Hazleton, Monessen and South Fork (2);

Nineteen (19) expire in one year, namely, that issued to Aliquippa, also those to Colwyn, Darby, Lansdowne and Yeadon, which tentatively approve a joint sewage disposal scheme for the four places and require the preparation of temporary sewage treatment plans at once; and those to Susquehanna Depot and the West Pittsburg Realty Company, which tentatively approve sewage treatment plans; those to the following places: Bellevernon, Brownsville, Charleroi, Clearfield, Corry, Lancaster, North Braddock (1st permit), Scott Township, Shinglehouse, South Brownsville and Warren, which are required to submit sewage treatment plans in one year; and a second permit to North Braddock, requiring it to submit sewage treatment plans on order.

Thirty-three (33) expire in two years; those to the West Liberty Improvement Company and the American Steel and Wire Company; also those to the following places, which are required to submit sewage treatment plans within the two years: Bath, Cheswick (second permit), Millvale, New Castle (sewage treatment site approved), Osborne, Philadelphia (14), Pitcairn, Pittsburgh (4), Sharpsville (sewage treatment plans tentatively approved) and Wilkinsburg; those to the following places, which are required to submit sewage treatment plans within one year; Erie (tentative sewage disposal plans approved), Pennsylvania State College and Towanda; and that to Mt. Pleasant, which is required to submit sewage-treatment plans in six months, and that to Wyoming, which is required to submit sewage treatment plans on order.

Seven (7) expire in three years: those to Cheswick (first permit) and Olyphant; also those to Chester and Marcus Hook, for which sewage disposal plans are tentatively approved; that to Hastings, which is required to submit sewage treatment plans in three years; those to Mayfield Yards and Parsons, which are required to submit sewage treatment plans or discontinue the discharge of sewage on order.

Two (2) extend for an indefinite term, one to the East Wilkinsburg Improvement Company and one to Uniontown, the latter being required to at once prepare plans for a comprehensive sewerage system.

The 14 permits and decrees approving plans for sewage treatment works were issued to Doylestown Sewerage Company, Houtzdale, Mars (second decree), Lehigh County Commissioners, Mt. Gretna Park (two decrees), Pennsylvania Reform School at Morganza, Pennsylvania Training School at Elwyn, Philadelphia (Pennypack Creek District), State Hospital for Insane at Norristown and the State Institution at Polk; also to the following, from which modified or more complete plans are required before final approval can be given: Carmichaels, Lehighton and Jefferson County Commissioners. These approvals of sewage disposal plans are in addition to the approval given in a number of instances in permits for the temporary discharge of crude sewage.

The 5 decrees rejecting or withholding approval of sewer plans were issued to the following, rejecting the plans submitted: Mansfield and South Fork (first decree); and to the following, withholding approval of plans submitted until sewage treatment plans have been prepared: Green Tree, Masontown and Petersburg.

The 2 decrees rejecting sewage treatment plans are a decree to Pleasantville, withholding approval because of lack of details, and a decree to West Chester, rejecting plans for modifications from the design of sewage treatment works as previously approved by the Department. Other rejections of sewage treatment plans are enumerated in the following paragraph.

The 19 decrees requiring the preparation at once of plans of sewage treatment works were issued to Easton (two decrees), Emporium, Jeannette, Josephine Furnace and Coke Company, North Charleroi, Rochester, Schuylkill Haven, Somerset, South Bethlehem, Northampton County (first decree), Tyrone and Vesta Coal Company; also to the following places whose sewage treatment plans, already submitted, are rejected: Coudersport, Danville, Dormont (2 decrees), Mars (first decree), Upland and West Newton.

The 491 sewerage permits and decrees issued since the creation of the State Department of Health, several to the same place in a number of cases, are listed in the following table. Recipients, which are not municipal corporations, are set in under the city, borough or township in which located; except those which maintain or propose sewerage systems in suburban districts and are set in under the central town when it also has received a permit or decree. All recipients and all municipalities in which the works are to afford sewerage are also indexed alphabetically.

SEWERAGE PERMITS AND DECREES ISSUED.

No. of Municipalities.	Place.	Number of years.					
		1905-06.	1907.	1908.	1909.	1910.	Total.
1	Aliquippa,		2			1	3
	Allegheny City Home (see O'Hara Twp.),						
	Allegheny County Work House (see O'Hara Twp.),						
2	Allentown,			1			1
	American Steel & Wire Co. (see under Donora),						
	Aspinwall-Delafield Co. (see O'Hara Twp.) Twp.),						
3	Avoca,				1		1
4	Baden,		1				1
5	Baldwin Twp.,						
	West Liberty Imp. Co.,					1	1
6	Barnesboro,			1			1
7	Bath,					1	1
8	Beaver,			1			1
9	Beaver Falls,				1		1
10	Bedford,		1		1		2
	Beechwood Park Amusement Co. (see Haverford Twp.),						
11	Bellefonte,			1			1
12	Bellevernon,					1	1
13	Bellevue,				1		1
14	Ben Avon,			1			1
15	Big Beaver Twp.,						
	Koppel Land Co.,				2		2
16	Big Run,		1				1

SEWERAGE PERMITS AND DECREES ISSUED—Continued.

No. of Municipalities.	Place.	Number of years.					
		1905-06.	1907.	1908.	1909.	1910.	Total.
17	Blairsville,	--------	1	--------	1	--------	2
18	Blakely,	1	--------	--------	1	--------	2
19	Bloomsburg,	1	--------	--------	--------	--------	1
20	Brackenridge,	--------	--------	2	1	--------	3
21	Braddock Twp. (see East Wilkinsburg Imp. Co.),	--------	--------	--------	--------	--------	--------
22	Bradford,	--------	--------	1	--------	--------	1
23	Bristol,	--------	1	--------	--------	--------	1
24	Brownsville,	--------	--------	--------	--------	1	1
	Bryn Athyn (Ass'n) (see Moreland Twp),	--------	--------	--------	--------	--------	--------
25	Burrell Twp.,	--------	--------	--------	--------	--------	--------
	Josephine Furnace and Coke Co.,	--------	--------	--------	--------	1	1
26	Butler,	--------	1	--------	--------	--------	1
27	California,	--------	--------	1	--------	--------	1
28	Cambridge Springs,	--------	1	2	1	--------	4
29	Canonsburg,	--------	--------	1	--------	--------	1
30	Canton,	--------	1	--------	--------	--------	1
31	Carbondale,	--------	--------	--------	2	1	3
32	Carbondale Twp.,	--------	--------	--------	--------	--------	--------
	Mayfield Yards (Citizens),	--------	--------	--------	--------	1	1
33	Carlisle,	--------	2	--------	--------	--------	2
34	Carmichaels,	--------	--------	--------	--------	1	1
35	Carrick,	1	--------	1	--------	--------	2
36	Carroll Twp. (see under Donora, Am. Steel & Wire Co.),	--------	--------	--------	--------	--------	--------
37	Cecil Twp.,	--------	--------	--------	--------	--------	--------
	Penna. Reform School (Morganza),	--------	--------	1	--------	1	2
38	Chambersburg,	--------	1	--------	--------	--------	1
39	Chapman Twp. (see under Renovo, Drocton Land Co.),	--------	--------	--------	--------	--------	--------
40	Charleroi,	--------	--------	--------	--------	1	1
41	Chartiers Twp.,	--------	2	--------	--------	--------	2
42	Chester,	--------	--------	1	--------	1	2
	Chester Springs Soldiers Orphan School (see W. Pikeland Twp.),	--------	--------	--------	--------	--------	--------
43	Cheswick,	--------	--------	3	--------	2	5
44	Clearfield,	--------	--------	--------	1	1	2
45	Clintonville,	--------	--------	1	--------	--------	1
46	Coaldale,	--------	1	1	--------	--------	2
47	College Hill,	--------	--------	--------	2	--------	2
48	College Twp. (see under State College; John Hamilton),	--------	--------	--------	--------	--------	--------
49	Columbia,	--------	1	1	--------	--------	2
50	Columbus Twp. (see Howard Tannery, under Corry),	--------	--------	--------	--------	--------	--------
51	Colwyn,	--------	--------	1	--------	1	2
52	Conewango Twp., Warren Co. (see under Warren State Hosp. for Insane),	--------	--------	--------	--------	--------	--------
53	Connellsville,	--------	--------	1	1	--------	2
54	Coraopolis,	--------	1	--------	--------	--------	1
55	Corry,	--------	--------	1	--------	1	2
	Howard Tannery (Columbus Twp.),	--------	--------	1	--------	--------	1
56	Coudersport,	--------	--------	--------	--------	1	1
	Cressman, Philip (see Perkasie),	--------	--------	--------	--------	--------	--------
57	Cresson,	--------	1	--------	--------	--------	1
58	Danville,	--------	--------	2	--------	1	3
	State Hosp. for the Insane (Mahoning Twp.),	--------	--------	--------	1	--------	1
59	Darby,	--------	--------	1	--------	1	2
	Delmont Land Co. (see Dormont),	--------	--------	--------	--------	--------	--------
	Dermandy Sanatorium (see Springfield Twp.),	--------	--------	--------	--------	--------	--------
60	Derry,	--------	1	2	--------	--------	3
	Devon (Citizens) (see Easttown Twp.),	--------	--------	--------	--------	--------	--------
61	Dickson City Borough,	--------	--------	1	--------	--------	1
	Dixmont, W. Penna. Hosp. for the Insane (see Kilbuck Twp.),	--------	--------	--------	--------	--------	--------
62	Donora,	--------	--------	--------	1	--------	1
	American Steel & Wire Co. (for S. Donora, Carroll Twp.),	--------	--------	--------	--------	1	1
63	Dormont,	--------	--------	--------	--------	2	2
	Delmont Land Co.,	--------	--------	--------	1	--------	1

SEWERAGE PERMITS AND DECREES ISSUED—Continued.

No. of Municipalities.	Place.	Number of years.					
		1905-06.	1907.	1908.	1909.	1910.	Total.
64	Dorranceton,			1			1
65	Doylestown,						
	Doylestown Sewerage Co.,				1	1	2
	Drocton Land Co. (see under Renovo),						
66	DuBois,				1		1
67	Dunmore,		1				1
	Dysart, A. P., (see Scott Twp),						
68	Eagles Mere,			1			1
69	East Bethlehem Twp.,						
	Vesta Coal Co.,					1	1
70	East Brady,	1					1
71	East McKeesport,		1				1
72	East Mauch Chunk,		1				1
73	Easton	1			1	2	4
74	East Stroudsburg,			1			1
75	Easttown Twp., Chester Co.,						
	Devon Citizens,			1			1
76	East Vincent Twp.,						
	E. Penna. State Inst. for Feeble Minded & Epileptic (near Spring City),	1					1
	East Wilkinsburg Imp. Co. (Braddock & Wilkins Twps.),					1	1
77	Edgeworth,	1	1				2
78	Edinboro,		1				1
79	Edwardsville,			1			1
80	Ellwood City Borough,		1	1			2
	Elwyn, Penna. Training School (see Middletown Twp.),						
81	Emlenton,			1			1
82	Emporium,	1				1	2
83	Emsworth,	1					1
84	Erie,				1	1	2
	Erie Imp. Co. (Mill Cr. & Harbor Cr. Twps.),			1			1
85	Etna,				1		1
86	Exeter,			1			1
87	Fairchance,			1			1
	Fair Oaks Land Co. (see Leet Twp.),						
88	Ford City Borough,		2				2
89	Forest City Borough,		1	1			2
90	Franklin,			1	1		2
91	Freeport,			1			1
92	Gaysport,	1					1
	Girls' Dept. of the House of Refuge (see Middletown Twp.),						
93	Glassport,			1		1	2
94	Green Tree,					1	1
95	Greenville,	1	1				2
96	Grove City,			1	1		2
97	Hallstead,	1					1
	Hamilton, John (see under State College),						
98	Hanover,						
	Hanover Sewer Co.,				1		1
99	Hanover Twp., Lehigh Co.,						
	Homeopathic State Hosp., near Rittersville,			1			1
100	Harbor Creek Twp. (see under Erie, Erie Imp. Co.),						
101	Harrisburg,	1	1		2		4
	Penna. State Lunatic Hosp. (Susquehanna Twp.),				1		1
	Suburban Drainage Co. (Susquehanna Twp.),				1		1
102	Harrison Twp.,		1				1
103	Hastings,				1	1	2
104	Haverford Twp.,						
	Beechwood Park Amusement Co.,			1			1
	Haverford College,			1			1
105	Hazleton,				1	1	2
106	Hollidaysburg,	1					1
107	Hopewell Twp.,						
	Jones & Laughlin Steel Co. (for Woodlawn, since incorporated),			1			1

SEWERAGE PERMITS AND DECREES ISSUED—Continued.

No. of Municipalities.	Place.	Number of years.					
		1905-06.	1907.	1908.	1909.	1910.	Total.
	House of Refuge (Girls' Dept. see Middletown Twp.),						
108	Houtzdale,			1		1	2
	Howard Tannery (see under Corry),						
109	Hughesville,			1			1
110	Huntingdon,			1			1
	Penna. Industrial Reformatory (Smithfield Twp.),				1		1
111	Indiana,		2	1			3
112	Jeanette,		1		1	1	3
	Jefferson Co. Commissioners (see Pine Cr. Twp.),						
113	Johnsonburg,		2				2
	Jones & Laughlin Steel Co. (see Hopewell Twp.),						
	Josephine Furnace & Coke Co (see Burrell Twp.),						
114	Kane,		3	1			4
115	Kilbuck Twp., Allegheny Co.,						
	Western Penna. Hosp. for the Insane, Dixmont,				1		1
116	Kingston,	1					1
117	Kittanning,			1			1
118	Knoxville,				1		1
	Koppel Land Co. (see Big Beaver Twp.)						
119	Lancaster,	1	3	2		1	7
120	Lansdowne,			1		1	2
121	Lansford,	1					1
122	Leet Twp.,						
	Fair Oaks Land Co.,			1			1
	Lehigh Co. Commissioners (see S. Whitehall Twp.).						
123	Lehighton,					1	1
124	Lewisburg,	1			1		2
125	Lewistown,				1		1
126	Ligonier,	1					1
127	Lower Heidelberg Twp., Berks Co.,						
	State Asylum for Chronic Insane, Wernersville,				1		1
128	Lower Merion Twp.,	1	1		2		4
129	Lower Providence Twp., Montgomery Co.,						
	Phila. Jewish Sanatorium at Eagleville				1		1
130	Lower Towamensing Twp., Carbon Co.,						
	New Jersey Zinc Co.,		1				1
	Palmer Land Co.,			1			1
131	McAdoo,				2		2
	McClure, H. M. (see Selinsgrove),						
132	McKeesport,			3			3
133	Mahoning Twp. (see State Hosp., Danville)						
134	Manorville,				1		1
135	Mansfield,					1	1
136	Marcus Hook,		1		1	1	3
	Marble & Frank (see Uniontown),						
137	Mars,				1	2	3
138	Masontown,					1	1
	Mayfield Yards (see Carbondale Twp.),						
139	Meadville,	1					1
140	Mercer,			1			1
141	Middletown,						
	Middletown Drainage Co.,			1			1
142	Middletown Twp., Dela. Co.,						
	Girls' Dept. of House of Refuge, Darlington,			1			1
	Penna. Training School, at Elwyn,			1		1	2
	Williamson Free School of Mechanical Trades,			1			1
143	Mill Creek Twp. (see Erie, Erie Imp. Co.),						
144	Millvale,					1	1
145	Millville,				1		1
146	Milton,	1			1		2
147	Miners Mills,				1		1
148	Minersville,			1			1

SEWERAGE PERMITS AND DECREES ISSUED—Continued.

No. of Municipalities.	Place.	Number of years.					
		1905-06.	1907.	1908.	1909.	1910.	Total.
149	Monaca,			1			1
150	Monessen,				1	1	2
151	Montgomery,			1			1
152	Moreland Twp.,						
	Bryn Athyn Vil. Ass'n,			2			2
	Cecil Twp.),						
	Morganza, Penna. Reform School (see						
153	Mt. Carmel,	1		1			2
	Mt. Gretna (see S. Londonderry Twp.),						
154	Mt. Oliver,				1		1
155	Mt. Pleasant,				2	1	3
156	Mt. Union,			1			1
157	Nanticoke,				1		1
158	Narberth,		1				1
159	New Castle,	2	2	1		1	6
	New Jersey Zinc Co. (see L. Towamensing Twp.),						
160	New Kensington,			1	1		2
161	New Oxford,						
	New Oxford Drainage Co.,		1				1
162	Newport,		2				2
163	New Wilmington,			2	1		3
164	Norristown,						
	State Hosp. for the Insane,				1	1	2
165	North Braddock,				1	2	3
166	North Charleroi,					1	1
167	North East,			1			1
168	Northumberland,	1			1		2
169	Oakmont,		1				1
170	O'Hara Twp.,						
	Allegheny City Home,		1	1			2
	Allegheny Co. Work House,		1				1
	Aspinwall-Delafield Co.,	1					1
171	Oil City,	1			2		3
172	Olyphant,			1	2	1	4
173	Osborne,	1	2		1	1	5
	Palmer Land Co. (see Lower Towamensing Twp.),						
174	Parnassus,			1			1
175	Parsons,					1	1
176	Patterson Heights,				1		1
	Penna. Glue Co. (see Springdale)						
	Penna. Training School (see Middletown Twp.),						
177	Perkasie,						
	Philip Cressman,				3		3
178	Petersburg,					1	1
179	Philadelphia,		8	8	14	15	45
	Phila. Jewish Sanatorium (see Low. Prov. Twp.),						
180	Pine Creek Twp.,						
	Jefferson County Commissioners,					1	1
181	Pitcairn,		1		1	1	3
182	Pittsburgh					1	1
	Pittsburgh Filter Plant		1				1
183	Pleasantville,					1	1
184	Polk,						
	State Inst. for Feeble Minded,		1			1	2
185	Pottsville,			1	1		2
	Yorkville (annexed to Pottsville in 1907),		1				1
186	Punxsutawney,				1	1	2
187	Radnor Twp., Dela. Co.,						
	Wayne Sewerage Co.,	1					1
188	Reading,			3			3
189	Renovo,				1		1
	Drocton Land Co. (Chapman Twp.)	1					1
190	Reynoldsville,			1			1
191	Ridgway,			1			1
192	Ridley Park,			1			1
	Rittersville (see Hanover Twp., Homeo State Hosp. for Insane),						
193	Rochester,					1	1

SEWERAGE PERMITS AND DECREES ISSUED—Continued.

No. of Municipalities.	Place.	Number of years.					
		1905-06.	1907.	1908.	1909.	1910.	Total.
194	St. Clair,			1	1		2
195	St. Marys,		1				1
196	Saltsburg,		1				1
197	Sayre,	1			1		2
198	Scalp Level,		1	2			3
199	Schuylkill Haven,					1	1
200	Scottdale,			1	1		2
201	Scott Twp., Allegheny Co.,					1	1
	Delmont Land Co. (annexed in 1909 to Dormont, q. v.),						
	Dysart, A. P.,			1			1
202	Selinsgrove,						
	H. M. McClure,	2					2
203	Sewickley,			1	1		2
204	Shaler Twp.,		1				1
205	Sharon,			1			1
206	Sharon Hill,	1		1			2
207	Sharpsville,			1		1	2
208	Shenandoah,			1			1
209	Shinglehouse,					1	1
210	Siverly,				1		1
211	Slippery Rock,				1		1
212	Smethport,				1		1
213	Smithfield Twp. (see under Huntingdon, Penna. Ind. Reformatory),						
214	Somerset,					1	1
215	South Bethlehem, Armstrong County,				1		1
216	South Bethlehem, Northampton County,	1				2	3
217	South Brownsville,					1	1
218	South Canonsburg,			2			2
219	South Fork,					3	3
220	South Londonderry Twp.,						
	Mt. Gretna Park,					2	2
221	South Sharon,			1			1
222	South Whitehall Twp.,						
	Lehigh Co. Commissioners,					1	1
	Spring City (see State Inst. for F. M. & E., East Vincent Twp.),						
223	Springdale (Inc. Oct. 17, 1906, from part of Springdale Twp.),						
	Penna. Glue Co. (decree June 20, 1906),	1					1
224	Springfield Twp., Dela. Co.,						
	Dermady Sanatorium,	1					1
225	State College Borough,						
	Penna. State College,					1	1
	John Hamilton (College Twp.),				1		1
	State Institutions,						
	Chester Springs Soldiers Orphans School (see West Pikeland Twp.),						
	E. Penna. State Inst. for the F. M. & E. (near Spring City, see East Vincent Twp.),						
	Homeopathic State Hosp. for the Insane (Rittersville, see Hanover Twp.),						
	Penna. Ind. Reformatory (see under Huntingdon),						
	Penna. Reform School (Morganza, see Cecil Twp.),						
	Penna. State College (see State College)						
	Penna. State Hosp. at Harrisburg (see under Harrisburg),						
	State Asylum for the Chronic Ins. of Pa. (Wernersville, see Heidelberg Twp.),						
	State Hosp. for the Ins. at Danville (see under Danville),						
	State Hosp. for the Ins. at Warren (see under Warren),						
	State Hosp. for the Ins. of the S. E. Dist. (see Norristown),						
	State Inst. for Feeble Minded (see Polk)						
226	Stoystown,	1					1

SEWERAGE PERMITS AND DECREES ISSUED—Continued.

No. of Municipalities.	Number of year.	Place					
		1905-06	1907	1908.	1909.	1910	Total
227	Stroudsburg,			1			1
	Suburban Drainage Co., (see under Harrisburg),						
228	Summit Hill,		1	1		1	3
229	Sunbury,						
	Three sewer companies,	3					3
230	Susquehanna Depot,	1			1	1	3
231	Susquehanna Twp. (see State Hosp. and Suburban Drg. Co. under Harrisburg)						
232	Swarthmore,			1	1		2
233	Tarentum,			1	2		3
234	Taylor,		1		1		2
235	Taylor Twp., Lawrence C.,						
	West Pittsburg Realty Co.,				1	1	2
236	Titusville,	1	1				2
237	Towanda,					1	1
	Trevorton Sewerage Co. (see Zerbe Twp.)						
238	Tyrone,					1	1
239	Union City,			1			1
240	Uniontown,				2	1	3
	Markle & Frank,				1		1
241	Upland,			1		1	2
242	Verona,		1	1			2
243	Versailles,		1				1
	Vesta Coal Co. (see East Bethlehem Twp.)						
244	Wall,		1				1
245	Warren,	1	1		1	1	4
	State Hosp. for the Insane (Conewago Twp.),		1				1
246	Washington,		1		1	1	3
247	Watsontown,			1			1
	Wayne Sewerage Co. (see Radnor Twp.),						
248	Wellsboro,	1		1			2
	Wernersville (State Asyl. for Chron. Insane (see L. Heidleberg Twp.),						
249	West Brownsville,						
250	West Chester,				1		1
251	West End,	1				1	2
252	West Hazleton,				1		1
	West Liberty Imp. Co. (see Baldwin Twp.),				1		1
253	West Middlesex,						
254	West Newton,	1					1
255	West Pikeland Twp.,				1	1	2
	Chester Springs Soldiers Orphans School,						
	West Pittsburg Realty Co. (see Taylor Twp.)				1		1
256	West Reynoldsville,						
257	West View,			1			1
258	White Haven,				1		1
259	Wickboro,			1			1
260	Wilkinsburg,			1			1
261	Wilkins Twp. (see E. Wilkinsburg Imp. Co.)					1	1
	Williamson Free School of Mechanical Trades (see Middletown Twp.),						
262	Williamsport,						
263	Winton,		2				2
264	Wyoming,				1		1
265	Yeadon,		1			1	2
266	York,			1		1	2
267	Yorkville (Annexed in 1907 to Pottsville, q. v.),	1	1				2
268	Youngsville,						
269	Youngwood,	1					1
270	Zelienople,			1			1
271	Zerbe Twp., Northumberland Co.,	1		1			2
	Treverton Sewerage Co.,			1			1
	Summary,	51	86	129	114	111	491

Before the State undertook the administration of the law compelling corporations to submit their sewerage plans to the Commissioner of Health for approval, haphazard methods of building sewers regardless of system were in vogue quite generally throughout the Commonwealth. Now this has been changed. Some idea of the value of the engineering work of the Department may be obtained from considering the fact that at the present time 126 public or private corporations have prepared comprehensive plans for sewerage which this Department has ordered and has approved, and sewers extended by these places from year to year are laid in conformity with these plans. The State could not be a party to a plan for desultory additions to existing sewers, regardless of system. It needed only the initiatory action of the State to show the local authorities the wisdom of proceeding according to this plan. In the following table are given the names of the 126 places where comprehensive plans have been prepared and approved and the sewers are now being built in conformity therewith:

Aliquippa.
Allentown.
Aspinwall-Delafield Company.
Avoca.
Baden.
Beaver.
Bedford.
Bellevue.
Ben Avon.
Blakely.
Brackenridge.
Bristol.
Cambridge Springs.
Canonsburg.
Carlisle.
Carmichaels.
Carrick.
Chambersburg.
Chester.
Cheswick.
Coaldale.
Columbia.
Colwyn.
Coudersport.
Cressman, Philip (Perkasie).
Cresson.
Darby.
Derry.
Dickson City.
Delmont Land Company.
Dormont.
Dorranceton.
Doylestown Sewerage Company.
Drocton Land Company.
Dunmore.
Dysart, A. P. (Scott Twp.)
Eagles Mere.
East Brady.
East Mauch Chunk.
Easton.
East Wilkinsburg.
Edwardsville.
Ellwood City.
Emlenton.
Emsworth.
Erie.
Fair Oaks Land Company.
Forest City.
Green Tree.
Greenville.
Grove City.
Lewisburg.
Lewistown.
Ligonier.
Lower Merion Township.
McAdoo.
Marcus Hook.
Mars.
Masontown.
Mayfield Yards.
Mercer.
Millvale.
Milton.
Miners Mills.
Mt. Carmel.
Mt. Gretna Park.
Mt. Oliver.
Mt. Pleasant.
Mt. Union.
Narberth.
New Castle.
Newport.
New Wilmington.
North East.
Olyphant.
Osborne.
Palmer Land Company.
Parsons.
Reading.
Ridgway.
St. Clair (Allegheny Co.)
St. Mary's.
Sayre.
Scott Township.
Sewickley.
Shaler Township.
Sharon Hill.
Sharpsville.
Siverly.
Somerset.
South Canonsburg.
Summit Hill.
Susquehanna Depot.
Swarthmore.
Tarentum.
Upland.
Vesta Coal Company.
Wall.
Warren.
Washington.
Watsontown.
Wayne Sewerage Company.

Hamilton, John (College Twp.)
Hastings.
Houtzdale.
Jones & Laughlin Steel Company.
Indiana.
Jeanette.
Kane.
Kingston.
Koppel Land Company.
Lancaster.
Lansdowne.
Lehighton.
West Chester.
West End.
West Hazleton.
West Liberty Improvement Company.
West Newton.
West Pittsburg Realty Company.
West View.
Wilkinsburg.
Winton.
Wyoming
Yeadon.
York.

In 34 places sewage treatment works have been built or are in progress of erection. They are as follows:

Allegheny City Home.
Allegheny County Work House.
Bryn Athyn Village Association.
Chester Springs Soldiers' Orphans' School.
Cressman, Philip (Perkasie).
Dermady Sanatorium, near Morton.
Derry.
Doylestown Sewerage Company.
East Penna. State Inst. for Feeble Minded and Epileptic, near Spring City.
Girls' Dept., House of Refuge, at Darlington.
Haverford College.
Homeopathic State Hosp. for the Insane, near Rittersville.
Howard Tannery, near Corry.
Indiana.
Lehigh County Commissioners.
Mt. Gretna Park.
New Jersey Zinc Company, at Palmerton.
Palmer Land Company, at Palmerton.
Pennsylvania Glue Company, at Springdale.
Pennsylvania Industrial Reformatory, near Huntingdon.
Pennsylvania Reform School, at Morganza.
Pennsylvania State Lunatic Hospital, near Harrisburg.
Philadelphia (Pennypack Creek District).
Philadelphia Jewish Sanatorium, at Eagleville.
Pittsburgh Filter Plant.
Reading.
State Asylum for Chronic Insane, at Wernersville.
State Asylum for Insane, near Danville.
State Hospital for Insane, at Norristown.
State Institution for Feeble Minded, at Polk.
Washington.
Wayne Sewerage Company.
Western Penna. Hospital for Insane, at Dixmont.
Williamson Free School of Mechanical Trade.

In 38 cases plans for sewage treatment works have been submitted to and either finally or tentatively approved by the State Department of Health, but no construction work has been done up to the present time. These places are as follows:

Allentown.
Beechwood Park Amusement Company.
Bristol.
*Canonsburg.
Carlisle.
Carmichaels.
Chambersburg.
Chester.
**Colwyn.
**Darby.
Easton.
Marcus Hook.
Mars.
Milton.
Mt. Carmel.
New Castle.
New Oxford Drainage Company.
Penna. Training School at Elwyn.
St. Mary's.
Sewickley.
Sharpsville.
*South Canonsburg.

Devon.
Ellwood City.
Erie.
Greenville.
Grove City.
Houtzdale.
Jefferson County Commissioners.
**Lansdowne.
Lehighton.
Susquehanna Depot.
Swarthmore.
Tarentum.
West Chester.
West Pittsburg Realty Company.
West View.
**Yeadon.
York.

*Joint Scheme. **Tentative joint scheme for four places.

The reason that most of the above places have as yet undertaken no construction work is that they have permits which have not yet expired for the temporary discharge of crude sewage into State waters, as listed in a later table. A number of others of the above places are small communities which have as yet no sewers, but have prepared sewage disposal plans in advance. A few are delinquent and are illegally discharging sewage.

There are five municipalities of the above list which have held popular elections to authorize the increase of municipal indebtedness to defray the cost of sewerage and sewage treatment works where the proposition was voted down, namely:

Allentown.
Carlisle.
Easton.
West Chester.
York.

There are 9 places which have not accepted the terms of permits issued to them, namely:

Bloomsburg.
Clintonville.
East Brady.
East Mauch Chunk.
Edgeworth.
Wall.
West Middlesex.
Yorkville.
Zelienople.

There are 53 places which have received decrees requiring the discontinuance of the discharge of sewage, or withholding permission to increase this discharge, into State Waters. These places are as follows:

Beaver Falls.
Bellefonte.
Big Run.
Canton.
College Hill.
Coudersport.
Danville.
Dormont.
East End Sewer Company (Sunbury).
East Stroudsburg.
Edinboro.
Emporium.
Green Tree.
Hallstead.
Hanover Sewer Company.
Harrison Township.
Jeannette.
Josephine Furnace & Coke Co.
Knoxville.
Koppel Land Company.
Ligonier.
Mansfield.
Markle & Frank (Uniontown).
Millville.
New Kensington.
North Charleroi.
North East.
Parnassus.
Patterson Heights.
Petersburg.
Pleasantville.
Pottsville.
Renovo.
Ridley Park.
Rochester.
Schuylkill Haven.
Shaler Township.
Sharon.
Shenandoah.
Slippery Rock.
Somerset.
South Sharon.
State Hosp. for Insane, near Warren.
Trevorton Sewerage Company.
Tyrone.
Upland.
Versailles.
Vesta Coal Company.
West Brownsville.
West Newton.
West Reynoldsville.
White Haven.

To 15 places, as listed below, permits have been issued for the discharge of sewage into State waters temporarily but without a date being set for the expiration of this permission. The sewage may have to be treated at any time.

Aspinwall-Delafield Company.
Canonsburg.
Donora.
Dunmore.
Dysart, A. P. (Scott Twp.)
East Wilkinsburg Improvement Co.
Fairchance.
Lower Merion Township.
McClure, H. M. (Selinsgrove).
Minersville.
Narberth.
Sharon Hill.
South Canonsburg.
Uniontown.
Wellsboro.

The Aspinwall-Delafield Company discharges sewage into the Aspinwall borough sewer system and it is stipulated that whenever sewage treatment is required of the borough the same requirement will be made of the company. Canonsburg and South Canonsburg have had a joint sewage treatment scheme approved by the Department which is to be installed as soon as practicable. Dunmore discharges sewage into the sewers of Scranton and will be required to take up the question of sewage treatment when the latter place is so required. The East Wilkinsburg Improvement Company discharges sewage into the sewers of North Braddock which, under the terms of a local agreement, is responsible for the treatment of the sewage when this becomes necessary. The sewers of Lower Merion Township, and, through them, the sewers of Narberth discharge into the sewerage system of Philadelphia. The sewer system installed by A. P. Dysart has been taken over by Scott Township and is subject to the requirements made upon this township. Donora, Fairchance, Minersville, H. M. McClure (who maintains a sewer system for Selinsgrove), Sharon Hill and Uniontown, will be required to take up the question of treatment of sewage when it is practicable for the matter to be taken up in a general way with all the places in these respective sections. The sewage from many of these places goes into streams grossly polluted with acid mine drainage, so that there is not need at the present time for more than the preparation of comprehensive plans for the collection of sewage and its conveyance to a suitable site for a future sewage treatment plant. Wellsboro is not able at present to assume the financial obligation necessary for sewage treatment works; only a few much needed specific extensions have been approved and a permit for further extensions has been withheld.

In the following table are given the dates of expiration of permits issued to various places for the temporary discharge of untreated sewage into the waters of the State.

		1911	1912	1913
1	Aliquippa,	x		
2	American Steel & Wire Company,		x	
3	Avoca,		x	
4	Bath,	x		
5	Beaver,	x		
6	Bedford,		x	
7	Ben Avon,	x		
8	Blakely,		x	
9	Brackenridge,	x		
10	Bradford,	x		
11	Brownsville,	x		
12	California,	x		
13	Cambridge Springs,	x		
14	Carbondale,	x		
15	Chester,			x
16	Cheswick,		x	
17	Clearfield,	x		
18	Coaldale,	x		
19	Columbia,		x	
20	Colwyn,	x		
21	Corry,	x		
22	Darby,	x		
23	Dorranceton,	x		
24	Eagles Mere,	x		
25	Erie,		x	
26	Erie Improvement Company,	x		
27	Exeter,	x		
28	Grove City,	x		
29	Hamilton, John, (College Twp.),		x	
30	Hastings,			x
31	Hazleton,	x		
32	Hughesville,	x		
33	Huntingdon,	x		
34	Kane,	x		
35	Lancaster,	x		
36	Lansdowne,	x		
37	Lewisburg,		x	
38	Lewistown,	x		
39	McAdoo,		x	
40	Manorville,		x	
41	Marcus Hook,		x	
42	Mayfield Yards,		x	
43	Mercer,	x		
44	Middletown Drainage Company,	x		
45	Millvale,	x		
46	Milton,		x	
47	Miners Mills,		x	
48	Monaca,	x		
49	Mt. Pleasant,		x	
50	Mt. Union,	x		
51	Nanticoke,	x		
52	New Castle,	x		
53	New Wilmington,	x		
54	North Braddock,	x		
55	Northumberland,		x	
56	Olyphant,			
57	Osborne,	x		
58	Parsons,		x	
59	Pennsylvania State College,		x	
60	Philadelphia,		x	
61	Pitcairn,	x		
62	Pittsburgh,	x		
63	Reynoldsville,	x		
64	Ridgway,	x		
65	Sayre,			x
66	Scalp Level,	x		
67	Scott Township,	x		
68	Sewickley,		x	
69	Sharpsville,		x	
70	Shinglehouse,	x		
71	Smethport,	x		
72	South Bethlehem, Armstrong County,	x		
73	South Bethlehem, Northampton County,	x		
74	South Brownsville,	x		
75	Summit Hill,	x		
76	Susquehanna Depot,		x	
77	Tarentum,	x		
78	Towanda,			x

	1911	1912	1913
79 Warren,	x		
80 Watsontown,	x		
81 West Hazleton,	x		
82 West Liberty Improvement Company,	x		
83 West Pittsburgh Realty Company,	x		
84 Wilkinsburg,	x		
85 Wyoming,		x	
86 Yeadon,	x		

Sixty-seven permits to discharge sewage into the waters of the State cease on or before the 31st day of December, 1910; the names of the places are given in the following statement. There are various reasons why the sewage from these places should be permitted to discharge into the natural water courses for a while longer. In some instances towns do not have sufficient borrowing capacity at present to enable them to undertake the erection of sewage works. If proposed amendment to the constitution, now under consideration, to extend the municipal debt limit from seven per cent. of the assessed valuation, which is the present law, to ten per cent. of the assessed valuation, should be approved, a number of towns not able financially to make the improvements now will then be in a position to do so.

Baden.
Barnesboro.
Bellevernon.
Bellevue.
Blairsville.
Butler.
Carrick.
Charleroi.
Chartiers Township.
Connellsville.
Coraopolis.
Cresson.
Delmont Land Company.
Dickson City.
Drockton Land Company.
DuBois.
East McKeesport.
Edwardsville.
Emlenton.
Emsworth.
Etna.
Fair Oaks Land Company.
Ford City.
Forest City.
Fanklin.
Freeport.
Gaysport.
Glassport.
Harrisburg.
Hollidaysburg.
Johnsonburg.
Jones & Laughlin Steel Company.
Kingston.
Kittanning.
Lansford.
McKeesport.
Meadville.
Monessen.
Montgomery.
Mt. Carmel.
Mt. Oliver.
Newport.
Oakmont.
Oil City.
Punxsutawney.
St. Clair (Allegheny Co.)
St. Mary's.
Saltsburg.
Scottdale.
Siverly.
South Fork.
Stoystown.
Stroudsburg.
Suburban Drainage Company.
Susquehanna Sewer Company.
Swarthmore.
Taylor.
Third Ward Sewer Company.
Titusville.
Union City.
Verona West End.
Wickboro.
Williamsport.
Winton.
Youngsville.
Youngwood.

15. DESIGNS AND CONSTRUCTION.

The Engineering Division during the year has performed certain work at the Pennsylvania State South Mountain Sanatorium; at the sites of the Pennsylvania State Sanatorium for Tuberculosis near Cresson, Cambria County, and near Hamburg, Berks County; also at the State Institution for Feeble Minded of Western Pennsylvania, Polk, Venango County, and at the State Hospital for Chronic Insane at Wernersville, all of which is explained in the following pages under the heading of "Designs and Construction."

During the year 1907 the Commissioner of Health decided that all engineering to be done in connection with the Mont Alto State institution and all other sanatoria to be constructed by the State Department of Health should be done by the Engineering Division of the Department, and hence a section of designs and construction was formed. An effort has been made to confine the work to narrow limits, but in spite of this, during the current year several engineering undertakings authorized by Act of Assembly in addition to the founding of the new tuberculosis sanatoria have been put upon the Department.

It was also found advisable to place under the general oversight of this section drafting and map making.

A. Pennsylvania State South Mountain Sanatorium

The work at this institution has mainly consisted in the continuation of contract work started in 1909 and in the extensions of water supply and sewerage systems made necessary by the erection of new buildings. The maintenance of the sewage disposal plant, garbage incinerating plant, water pumping plants and pipe lines has been under the supervision of the Engineering Division.

Water Works.

During the early spring of 1909, as outlined in the annual report for that year, drilling was begun on a deep well near the waterworks pumping station at the sanatorium to obtain, if possible, an auxiliary supply of water for the institution.

Drilling proceeded regularly until December 18, 1909, when the depth of 466 feet had been reached. Strata of very hard rock were encountered and therefore the progress at times was slow. An intermission until February 13, 1910, was allowed the contractor because of the inclement weather and from this date until March 23rd the work was continued until a depth of 500 feet was reached. Several charges of dynamite had been exploded in the hole in order to permit the drill to advance. The final charge of 25 pounds was exploded at the bottom of the well on March 23rd. No opening of water bearing seams resulted and it was decided to abandon the work. During the progress of the drilling one or two very small streams were encountered but, when tested out, proved to have a flow of not more than a few hundred gallons in 24 hours.

In accordance with the terms of the contract, no payments were made until the depth of 500 feet had been reached. At that time and after the abandonment of the well, the following estimate, based on the original contract with Kohl and Sons, was made out and final payment for the work was made.

Article two of the contract proved that the average rate of work on the well should not be less than 4 vertical feet per day and article three provided that $5.00 per day should be deducted for each day or fraction thereof in which work was carried on after the expiration of the time specified. The actual work began on May 3, 1909, and was completed on March 23rd of the current year, so that there was a total of 323 days between the beginning and the completion of the contract. An allowance of 16 days was made between July 15th and 30th inclusive for placing the drop pipe an allowance of 58 days from December 18th to February 13th inclusive when the work was shut down during the extreme winter weather, which brings the total days deducted to 74, leaving a net period of 249 days in which work was carried on. The contract provided that 500 feet of well should be drilled in 125 days so that the contractor owed liquidated damages for 124 days at $5.00 per day, or a total of $620.

As the contractor had conscientiously attempted to complete the work in accordance with the terms of the contract and had for several weeks worked night and day on the well, and because of the fact that unusually hard rock had been encountered and practically brought the work to a standstill on several occasions, it was deemed impossible for him to complete the well in the time specified and therefore it was recommended that inasmuch as the State had not suffered any damage from this delay, the amount of liquidated damages be reduced to $150, as shown on the final estimate. This was accepted by the contractor who received $1,934.97 for the work.

DEPARTMENT OF HEALTH.

Engineering Division.

CONTRACT NO. 11. FINAL ESTIMATE.

FOR DRILLING AN "8" WELL TO A DEPTH OF 500 FEET AT THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM, NEAR MONT ALTO, PENNSYLVANIA. FROM MAY 3, 1909 TO MARCH 23, 1910. ACCOUNT OF CONTRACT WITH KOHL AND SONS, MYERSTOWN, PA.

Dated April 23, 1909.

(1) 8 inch well and up to 300 feet deep inclusive 300 feet at $3.50 per ft.,	$1,050 00
(2) 8 inch well over 300 feet deep and not exceeding 500 feet, 200 feet at $4.00 per ft.,	800 00
(6) 5 inch pipe for interior well lining in 8 inch well, 335 2/3 ft. at $0.70 per ft.,	234 97
	$2,084 97
Deduct liquidated damages for failure to complete well in specified time,	150 00
Final payment,	$1,934 97

April 14, 1910.

(Signed) THOS. FLEMING, Jr.,
Assistant Engineer in Charge.

Approved:

(Signed) F. HERBERT SNOW,
Chief Engineer.

During April, owing to the discouraging condition at the drilled well, further study was made for an auxiliary surface water supply for the sanatorium. It appears that during the Fall of 1909 a drought was experienced which was as severe as that of 1908, and it was at that time found necessary to install a temporary pumping plant from which water was forced from a small creek passing through Monegan's field into the water works system. One pump and engine had also forced water from a series of shallow dug wells in Monegan's field into the supply lines. This water was treated with hypo-chlorite of lime in order to prevent any possible contamination of the main water supply, and pumps operated day and night in order to develop the entire supply.

With the greatest economy during the drought the consumption of water at the institution ranged from 40,000 to 45,000 gallons a day as against the normal consumption of over 60,000 gallons a day.

The number of patients and others deriving their water from the sanatorium supply was estimated to be 879, the consumption therefore averaging the comparatively small amount of 68 gallons per capita daily. It was estimated that during the Summer this consumption would be materially increased, due to the use of water for lawns, pavements, etc., so that an average per capita consumption of about 80 gallons a day was anticipated. Contemplated additions to the sanatorium would increase the population to about 1177, which at the rate of 80 gallons per capita a day would require 95,000 gallons of water daily. It was estimated that a supply of 100,000 gallons a day was none too liberal. Records of the spring supplies showed that this amount of water could be obtained from them during seven months in the year and that an auxiliary supply for the remaining five months was necessary.

The cheapest installation to obtain such a supply could be located at the foot of the mountain in Mont Alto Park, from whence water might be forced through pipe lines into the existing system. The increased cost of operation against a high pressure was considered and also the fact that purification would at times be necessary to prevent possible contamination. The cost of delivering water from this source was estimated to be considerably greater than from the

Caledonia supply, which had been considered during 1909, but on account of the fact that the capital necessary was less than one-third of that required for the Caledonia project, and also because this plant would probably be used during only a portion of the year, the Mont Alto Park installation seemed preferable.

The proposed supply was to be taken from the head waters of the west branch of Little Antietam Creek at the foot of the mountain in Mont Alto Park, immediately below the junction of Brandon's Hollow Run and Tussock Swamp Run. The watershed above this point is 3.6 square miles in area, located entirely on State property. Several large springs in this area maintain an abundant dry weather flow. The largest of these are the Pearl of the Park Spring, Tarburner Spring and Travelers Spring. Accurate gaugings of the flow from this watershed showed that the minimum flow during the dry season of 1909 amounted to about 375,000 gallons in 24 hours. The watershed is covered with a second growth of timber and controlled by the State Forestry Department. A considerable portion of this area lies in the picnic grounds at Mont Alto Park. The main road between Mont Alto village and the sanatorium passes over the watershed.

Water from this stream is used by the State Forestry Academy, Mont Alto village, Smalls Mills and the Standard Oil pump station. The former obtains its supply by gravity from Tarburner Spring, around which a concrete wall has been constructed to form a receiving basin. This supply was being used when the gaugings given above were taken, so that the estimated average flow is not effected thereby.

The supply for the village of Mont Alto is obtained from the creek at a point near an old stone house immediately west of the park, where a small masonry receptacle is constructed on the bank of the creek near the highway and into which the water flows through a loose stone wall and thence by gravity to the village. The population of this community is estimated at 700, two-thirds of which use the supply which is delivered through a two-inch wrought iron pipe, the total capacity of which when clean and flowing full is estimated to be 44,500 gallons a day. Fifty gallons per capita for 466 persons amounts to 23,300 gallons a day so that the amount of water thus drawn from the spring does not seriously affect the proposed supply.

Smalls Mills has been abandoned for four or five years and it is thought that it would be impossible to operate it during the dry weather flow of this stream.

The Standard Oil pumping plant is at Knepper, one mile south of Mont Alto where a dam is constructed in the creek for impounding water. This plant has several drilled wells but it is understood that owing to the hardness of the water they are not used for boiler purposes. As the watershed of the creek is considerably larger at this point it was considered that no difficulty would be experienced by the persons above mentioned in obtaining enough water below the proposed waterworks to keep up the required supply.

It was decided to construct the pumping station at the point, previously described whence the water would be forced to a gravity mechanical sand filter on the mountain in the rear of the infirmary building and at a sufficient elevation to allow a flow at the maximum rate to the existing reservoir south of the sanatorium. A by-pass was to be constructed from this filter to a steel tank located at a higher elevation on the top of Rocky Mountain for fire protection. This by-pass was to be connected with the supply line from the filter to the existing main at the infirmary building, and during fires was to be turned into the system.

The proposed pumping station was to be located on the north bank of the creek at a point previously described. Two single acting triplex pumps each directly connected to a gasoline engine of 25 horsepower were to form the power of equipment. Each pump was to have a capacity of 150,000 gallons per 24 hours operating against the maximum head, which would permit furnishing 100,000 gallons of water with 8 hours operation of both pumps, or in case one pump was out of service the same amount of water could be supplied in 16 hours. Both pumps in operation would furnish sufficient water to supply two three-quarter inch fire streams in the eastern section of the sanatorium with 50 pounds pressure at the fire plugs. These gasoline engines were to be guaranteed to consume not more than .10 of a gallon of gasoline per horse power hour.

A screen chamber of reinforced concrete was proposed, as well as a small concrete dam to divert the water thereto. This chamber was to be connected with the pump sump by means of two 8 inch cast iron pipes arranged so that one or the other could be operated. The sump was to extend lengthwise across the side of the building nearest the creek and to be constructed of reinforced concrete, 30 feet long, 4 feet wide and 12 feet deep, the bottom to be four feet below the bottom of the screen chamber thereby permitting four feet of water to stand above the suction end of the pipes.

A small receptacle was to be built inside the pump station for mixing coagulants to be used for preparing the water for the mechanical filters. As this water was found to contain only 3.5 parts of alkalinity per million, it was considered necessary to introduce lime with the alum. Orifice boxes were to regulate the feeding of the coagulent connecting the mixing tanks and the inlet pipe from the screen chamber, thus permitting the water to become thoroughly coagulated upon reaching the filters.

It was proposed to build a force main of 6 inch heavy cast iron bell and spigot pipe, placing the same at least four feet deep and taking particular care to avoid air pockets throughout the entire length of the line. This line was to be 8200 feet long divided into four sections, each controlled by gate and check valves; the gate valves to permit of repairs in any one section without draining the entire line, and the check valves to reduce water hammer. An air chamber in the pumping station on the force main was also proposed as a precaution against water hammer, in addition to those on the pumps.

During ordinary operation the water was to be pumped from the sump at an elevation of 1067 to the flow line in the filters at an elevation of 1746, a vertical distance of 679 feet. Should both filters be shut off, the water would go direct to the steel tank, a vertical distance of 734 feet.

The two filters were to be constructed of reinforced concrete, each having a capacity of 150,000 gallons for 24 hours and operated at a rate of 125 million gallons the acre each 24 hours. These filters were to be 11 feet 6 inches long, 5 feet 4½ inches wide by 7 feet deep and were to be located on the slope of the mountain in the rear of the infirmary with the bottom of the sump at an elevation of 1734. This would give sufficient head at maximum rate to deliver water to the existing reservoir, after deducting all frictional loss. The construction was to be monolithic, the concrete foundations extending to solid ground. The walls were to be nine inches thick and the bottom six inches. The manifold and strainer system were to be entirely surrounded and covered by ten inches of selected filter gravel on top of which was to be 30 inch layer of selected filter sand of the highest grade. The flow line was to be three feet above the sand. The pipe gallery, extending across the inlet ends of both filters, was to be used as the clear water receiving well from the supply main.

The inlet pipe of each filter was to be controlled by a butterfly valve with a float arranged to close automatically when the flow line elevation had been reached. A third butterfly valve was to be located on the main inlet pipe to automatically shut off the raw water when the flow line in the clear water well had been reached. Filtered water was to be conveyed from each filter by a manifold system consisting of 1½ inch laterals, 6 inches on center, tapped at 6 inch intervals for brass strainers which were to be furnished by the Department. The laterals were to connect with two 4 inch headers controlled by a standard rate controller.

The filter was to be washed with water from the steel tank admitted through a 6 inch wash line connecting with the manifold in each system. The wash water was to be drained off from the top through a steel trough extending lengthwise through the center of each unit, 18 inches above the sand and connecting with a small concrete trough at the outlet end, which in turn was to connect with the 6 inch sewer line draining into the valley. As raw water was to be used, it was expected to waste the refiltered water after each washing, by means of a 4-inch re-wash line from the manifold to the sewer line. Standard loss of head gauges were to be provided for each filter and connections made for sampling the re-wash water.

The entire filter plant was to be enclosed in a frame structure built in accordance with specifications similar to those for the pumping station. A wooden operating platform was to cover the filters. The side of the pipe gallery was to be sealed to prevent pollution of the clear water well.

The steel tank reservoir was to be 50 feet in diameter, 20 feet deep with a capacity of 300,000 gallons. The ground on the proposed site of this tank is of very rough formation, composed of large and small boulders securely wedged together, which it would be necessary to level off in order to make place for the foundation of the tank. This foundation was to be built of twelve inches of concrete, laid in two layers so that the upper layer would be impermeable. Before placing the tank the foundation was to be grouted with a mixture of neat cement and sand and leveled off so as to form an absolutely true base for the tank. Inlet pipes were to enter through a reinforced concrete manhole near the edge of the tank on the west. The tank was to be of steel plates ⅜ of an inch thick on the bottom and the sides of 2 rings, ⅜ of an inch and 5/16 of an inch thick respectively. A corrugated roof supported by light "I" beams was to cover the tank. The entire outside and inside surface of the roof and tank were to be painted with a first-class metal paint.

The inlet pipe from the filter to the tank was to be of cast iron 6 inches in diameter, following the foot of the slope to a point opposite the tank, in order to avoid trenching in rock. It was then to be laid directly up the side of the slope to the reinforced concrete manhole where it was to connect with the interior piping. The pipe from the tank was to be controlled by a flanged valve. Overflow pipes and a drain were to be provided for controlling the tank and were to drain into the valley below. The piping as contemplated was so arranged that all accidental loss of water would be prevented. The fire supply was to be controlled by a gate valve. Another gate valve was to be placed on the supply main outside the infirmary building to control the fire when the regular water works system was in operation and the auxiliary supply closed down.

The steel tank would enable the sanatorium to use fire streams from the hydrants above the dining building in the main camp with a pressure of 50 pounds to the square inch at the hydrants. Fire streams could also be operated under direct pressure from the existing pumping station at the sanatorium.

The plans and specifications as outlined in the preceding pages were drawn up in two sections. The first included pipe lines, valves, pumping station, pumps and engines; the second included the furnishing and erection of the steel tank. It was proposed to contruct the foundation and control manhole for the tank by day labor. It was considered advisable to divide the work in this way so as to avoid paying a contractor's profit on the steel tank and because better work would be obtained if the same were erected by the manufacturers. It was considered difficult for a contractor to estimate the cost of such foundation as was specified and therefore it was proposed to do the work with labor at the sanatorium. A copy of the estimate is given herewith.

I. PUMPING STATION AT MONT ALTO PARK.

2—Vertical single acting triplex pumps, 150,000 gallons per 24 hours, capacity each, under 336 lbs. working pressure, erected complete, $1,000 each,	$2,000 00	
2—Horizontal type "G" Olds gasoline engine, each 25 brake H. P., 225 r. p. m., erected complete, at $1,000 each,	2,000 00	
1—Pump station, frame construction,	800 00	
Concrete intake, sump, etc.,	200 00	
		$5,000 00

II. 6 INCH C. I. FORCE & SUPPLY MAIN.

Trenching—10,200 ft. @ 14c per ft.,	1,428 00
Backfill—10,200 ft. @ 3c. per ft.,	306 00
Rock excavation, 300 cu. yds. @ $2.50,	750 00
Yarn, 850 joints @ 0.321 lbs. per joint or 272.9 lbs. @ 6c. per lb.,	16 37
Lead, 850 joints @ 11.03 lbs. per joint or 9375.5 lbs. @ 5½c. per lb.,	515 65
Transportation on yarn and lead, 4.8 tons @ $2 84 lengths 6 inch c. i. pipe (800 ft. head) @ 595 lbs. per length—54.99 tons @ $27,	674 73
192 lengths 6 inch c. i, pipe (700 ft. head) @ 565 lbs. per length—54.24 tons @ $27.00,	1,464 48
159 lengths 6 inch c. i. pipe (500 ft. head) @ 500 lbs. per length—39.75 tons @ $27.00,	$1,073 25
84 lengths 6 inch c. i, pipe (300 ft. head) @ 430 lbs. per length—18.06 tons @ $27.40,	487 62
334 lengths 6 inch c. i. pipe (200 ft. head) @ 400 lbs. per length—66.8 tons @ $27.00,	1,803 60

3—6 inch gate valves and boxes for high pressure @ $35.00 each,	105 00	
7—6 inch gate valves and boxes for medium pressure @ $20.00 each,	140 00	
3—6 inch high pressure check valves @ $20 00 each,	60 00	
3—6 inch medium pressure check valves @ $15.00 each,	45 00	
Transportation distribution on 205 tons of pipe and valves @ $1.50 per ton,	307 50	
		$ 9,186 80

III. FILTERS AND EQUIPMENT.

2—150,000 gallons open filters @ $700.00 each,	1,400 00	
Superstructure,	600 00	
Foundation and sump,	200 00	
		$ 2,200 00

Estimated cost,	$16,386 80
Superstructure and contingencies 10 per cent.,	1,638 68
Total,	$18,025 48

The estimated cost of the steel tank and foundations is $5,000, bringing the total for this auxiliary supply to $23,025.48.

The work as outlined was advertised April 15, 1910, and the proposals were received until three P. M. on Monday, May 2nd. Four bids were received and the contract was awarded to the Pitt Construction Company, Fulton Building, Pittsburgh on May 7th. A tabulation of the bids received is given herewith.

Penna. Department of Health,
Engineering Division.
Bids for Water Works System, Mt. Alto, Pa.
May 2, 1910.

No.	Item.	Quan.	1. W. G. Fritz & Bro., York, Pa.		2. E. E. Bratton Co., Philadelphia, Pa.		3. Pitt Construction Co., 821 Fulton Bldg., Pittsburgh, Pa.		4. Engineer's estimate.	
			Unit Price.	Total.	Unit Price.	Total.	Unit Price.	Total.	Unit Price.	Total.
1	6″ C. I. pipe (595 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep, per foot,	1,000	$1 15	$1,150 00	$1 10	$1,100 00	$1 06	$1,060 00	$ 94	$940 00
2	6″ C. I. pipe (565 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep, per foot,	2,300	1 02	2,346 00	1 05	2,415 00	1 03	2,369 00	91	2,093 00
3	6″ C. I. pipe (500 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep, per foot,	1,900	99	1,881 00	95	1,805 00	93	1,767 00	83	1,577 00
4	6″ C. I. pipe (430 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep, per foot,	1,000	93	930 00	85	850 00	82	820 00	75	750 00
5	6″ C. I. pipe (400 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep, per foot,	4,000	92	3,680 00	80	3,200 00	80	3,200 00	72	2,880 00
6	Trench over 5 ft. deep and including 6 ft. depth, per foot,	600	05	30 00	10	60 00	10	60 00	23	138 00
7	Trench over 6 ft. deep and including 8 ft. depth, per foot,	300	10	30 00	20	60 00	25	75 00	28	84 00
8	6″ high pressure gate valves and boxes, per set,	3	37 40	112 20	63 00	189 00	40 00	120 00	38 00	114 00
9	6″ medium pressure gate valves and boxes, per set,	7	11 50	80 50	32 00	224 00	15 00	105 00	23 00	161 00
10	6″ high pressure flanged check valves,	3	38 00	114 00	32 00	96 00	40 00	120 00	23 00	69 00
11	6″ medium pressure check valves,	3	15 00	45 00	34 00	102 00	17 00	51 00	17 00	51 00
12	Flanged piping, etc., in pump-house, lump sum,		200 00	200 00	570 00	570 00	620 00	620 00	70 00	70 00
13	Triplex pumps, each,	2	1,275 00	2,550 00	1,500 00	3,000 00	950 00	1,900 00	1,125 00	2,250 00
14	Gasoline engines, each,	2	1,100 00	2,200 00	1,000 00	2,000 00	1,100 00	2,200 00	1,125 00	2,250 00
15	Pump house,	1	1,250 00	1,250 00	1,340 00	1,340 00	850 00	850 00	1,000 00	1,000 00
16	Sump, receiving chamber and connections, lump sum,		1,250 00	1,250 00	960 00	960 00	1,000 00	1,000 00	275 00	275 00
17	Two concrete filters and appurtenances, lump sum,		2,500 00	2,500 00	2,590 00	2,590 00	2,200 00	2,200 00	1,675 00	1,675 00
18	Filter house superstructure, lump sum,		1,100 00	1,100 00	970 00	970 00	700 00	700 00	900 00	900 00
19	Rock excavation, per cubic yard,	300	3 00	900 00	3 00	900 00	2 50	750 00	2 50	750 00
	Totals,			$22348 70		$22431 00		$19967 00		$18027 00

Formal notice to begin work was given the contractor on May 20th and a superintendent was immediately sent to the site and began to assemble a force of men and order materials for the construction. Permission was obtained on May 30th from the Forestry Department to erect a laborers' shanty and work was started on that date. Considerable difficulty was encountered by the contractor in securing labor during the entire time of the contract. Every effort was made to complete the work on time. However, seventy-three days of actual work were consumed instead of the seventy called for in the contract. Extra work, not covered by the items in the proposal was to be done on the basis of actual cost of labor and materials, plus 15 per cent. profit to the contractor.

It had been decided to temporarily omit the filters and filter house and this required some slight changes in the alignment of the pipe line near the point of connection of the proposed buildings. Plugs were left in the line for connection to these filters if built at a later date.

It was considered advisable to insert a relief valve at the pumping station to avoid damaging pumps or pipe upon an accidental or sudden stoppage of the line. This valve was placed on the discharge line inside the station. It was set to open automatically when the pressure exceeded 350 pounds to the square inch. To avoid air pockets in the pipe line, two air valves were placed at as many high points and were protected by cast iron valve boxes and wooden covers.

The original contract called for a concrete dam twenty feet long opposite the pump house and it was found necessary to extend it to 32 feet. It was also found necessary to carry the engine foundations to a greater depth than contemplated owing to a poor foundation. It was considered necessary to fill the space beneath the pump house floor with rammed dirt to avoid dampness.

The work under this contract was executed on the basis of unit quantities as shown on the table of proposals, the work being divided into nineteen items. In paying for cast iron pipe by weight per 12 foot length, bills of lading from the factory were used as a basis for determining the weights.

Excavation for the trench was difficult owing to large quantities of disintegrated rock and small boulders which were not large enough to entitle the contractor to payment for solid rock excavation, but nevertheless greatly hindered him in his work. A small amount of solid rock was encountered and paid for under the schedule of prices. Satisfactory foundation for pipe lines was encountered throughout the work. Type G, 25 H. P. Olds gasoline engines were furnished for the pumping station together with No. 52 Deming triplex pumps. These were in every way in accordance with the pumps called for in the specifications.

Following is the final estimate and payment based on the engineer's estimate of work included in the contract:

DEPARTMENT OF HEALTH.

Engineering Division.

CONTRACT NO. 14. FINAL ESTIMATE FOR WORK COMPLETED ON AUXILIARY WATER WORKS AT THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM, NEAR MONT ALTO, PENNSYLVANIA. ACCOUNT OF CONTRACT WITH THE PITT CONSTRUCTION CO., FULTON BUILDING, PITTSBURGH, PA. DATED MAY 18, 1910.

Dated May 18, 1910.

(1)	1,000 ft. 6″ c. i. pipe (595 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep @ $1.06 per linear ft.,	$1,060 00
(2)	2,300 ft. of 6″ c. i. pipe (565 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep @ $1.03 per linear ft.,	2,369 00
(3)	1,900 ft. of 6″ c. i. pipe (500 lbs. per 12 ft. length, laid complete in trench 4 ft. to 5 ft. deep @ $0.93 per linear ft.,	1,767 00
(4)	1,000 ft. of 6″ c. i. pipe (430 lbs. per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep @ $0.82 per linear ft.,	820 00

(5)	2,460 ft. of 6″ c. 1. pipe (400 lbs, per 12 ft. length), laid complete in trench 4 ft. to 5 ft. deep @ $.80 per linear ft.,	1,968 00
(6)	149 ft. of trench over 5 ft. deep and including 6 foot depth @ $0.10 per ft.,	14 90
(7)	395 ft. of trench over 6 ft. deep and including 8 ft. depth @ $0.25 per ft.,	98 75
(8)	3 6″ high pressure gate valves and boxes @ $40.00 per set,	120 00
(9)	2 6″ high pressure gate valves and boxes @ $15.00 per set,	30 00
(10)	3 6″ high pressure flanged check valves @ $40.00,	120 00
(11)	1 6″ medium pressure flanged check valve @ $17.00,	17 00
(12)	Flanged piping in pump house, connections and air chamber,	620 00
(13)	Triplex pumps @ $9.50 each,	1,900 00
(14)	2 gasoline engines complete @ $1,100 each,	2,200 00
(15)	1 pump house complete,	850 00
(16)	Sump and receiving chamber and connections,	1.000 00
(19)	230 cubic yards rock excavation @ $2.50 per cubic yard,	575 00

Extra work:

Filling in dirt under pump house @ cost plus 15%,	55 27
Extra 8″ c. i. pipe for screen chamber @ cost plus 15%,	11 30
Furnishing and placing relief valve @ cost plus 15%,	25 97
Furnishing and placing air vavles and piping @ cost plus 14%,	21 56
Furnishing and placing bell special castings @ cost plus 15%,	28 51
Extra concrete in dam and engine foundation @ cost plus 15%,	184 51
Total,	$15,858 77
Previously paid,	11,146 52
Balance due,	$4,712 25

THOS. FLEMING, Jr.,
Assistant Engineer in Charge of Work.

Approved: F. HERBERT SNOW,
Chief Engineer.

October 14, 1910.

The difference between the actual cost of the work and the engineer's estimate, after deducting the amounts paid for concrete filter and filter house, is accounted for by the decreased number of gate valves and by the smaller amount of 6-inch cast iron pipe, weighing 400 pounds per 12 foot length, used owing to the change in plan necessitated by the omission of filters and filter house.

On September 29th a final inspection of the work was made by the assistant engineer in charge of construction and the resident engineer, at which time a careful test of the pumping plant was made. Each pump and connected engine were separately tested with the result that the pumps delivered the quantity of water required by the specifications and the slip of the pumps was within the specified limit. The gasoline engines when developing the specified horsepower, operated under an amount of gasoline less than that required. In addition to the final test the contractor was required by the contract to operate the station for fifteen days after the test. During these fifteen days water was wasted from a fire hydrant installed at the top of the mountain near the infirmary and not pumped into the reservoir. Supplementary tests were made during this interval which showed that the operation of the pumps and engines was satisfactory.

As the water from Little Antietam Creek is subject to the danger of pollution and as the filters were omitted, apparatus for disinfecting the water by means of hypo-chlorite of lime was provided under the contract. It was decided that whenever necessary to furnish water for the sanatorium, this solution be added and a thorough investigation of the watershed be made prior to the pumping of the supply to the institution.

The pumping station is designed to give ample pressure in case of fire at the sanatorium. In case these pumps are operated for this purpose the reservoir at the camp should be shut off and the water pumped directly into the mains. In order to be prepared for this emergency, the pumps are to be operated for a short period at least once a week, which will not only insure the machinery against undue deterioration but will keep the engineer familiar with the operation of the plant.

The number of week days included during the period of construction was ninety-one. During this time three holidays and fifteen rainy days occurred, making a total of eighteen days to be deducted from the ninety-one elapsed week days, leaving seventy-three working days to be charged against the contractor. Under the terms of the contract an extension of time due to extra work is allowed. The extra work amounted to $329.12, which, compared with the total cost of the contract, entitled the contractor to an extension of about one and one-half days. The time actually employed on this extra work amounted to considerably more than one and one-half days and owing to this circumstance, an extension of time covering the three days over time was granted and no deduction was made from the contract price.

Sewerage and Sewage Disposal.

The sewage disposal plant at the institution has been in continuous operation since first placed in commission on October 8, 1908, and an operator has been in charge of the automatic apparatus, to clean the units, to mix the chloride of lime and to keep a daily record of the operation of the plant. In addition to this work he attends to flushing the sewers once each week by means of water connections in the manholes, and also to emptying the grease traps at the dining room and infirmary. Blanks have been furnished for daily reports which are filed in the Harrisburg office. The reports show the units in operation and the method of operating, whether automatic or by hand, the quantity of sewage treated, the quantity of chloride of lime being used, a record of the sludge bed in operation, cost of cleaning, operating expenses and weather conditions. In addition to this a bacterial analysis of the raw sewage and the effluent from each unit is made weekly from samples taken in the usual manner and shipped to the Department's laboratory in Philadelphia where count is made of the total number of bacteria and of B. Coli per c. c. in each sample.

On May 12th and June 9th, 1909, as shown in the annual report for that year reports on the operation of the sewage disposal plant and sewers were drawn up in which it was shown that the sewage disposal plant was being greatly overtaxed due to the large increase in population at the sanatorium. It was designed for 300 persons at sixty gallons per capita daily and at the time of these reports was treating several times this quantity. The outfall sewer was also receiving a large amount of ground water due to faulty construction. This added to the work of the disposal plant.

For this reason it was recommended that the disposal plant be enlarged and that the outfall sewer be repaired. This work was approved and construction started in the late fall of that year, the delay being caused in obtaining construction materials. The concrete work was completed during the middle of December but the roof forms could not be removed with safety until late in January. The tanks were tested during the first part of February and were placed in operation on the 15th of that month. Meanwhile the work of repairing the main sewer had been completed on October 16th, as described in the annual report of 1909.

The addition to the disposal plant consisted of two concrete septic tanks with screen chambers and appurtenances as well as a 10-inch by-pass pipe around the sand filters. Each tank has a capacity of 18,500 gallons and is constructed of reinforced concrete with walls nine inches thick and covered with a reinforced concrete roof four inches thick. The floors are four inches thick sloping six inches from inlet to outlet and where the sludge drain is located. In general details these tanks are similar to the one originally built. Inlet and outlet troughs are supported by reinforced concrete ribs for their entire length across the tank and galvanized iron slides are located in them at intervals, in order to be able to control the tank when operated in series. The sewage passes through a concrete chamber before entering the inlet trough. There are two screens two feet apart built ¼ inch round rods ¾ inches on centers. At the end of the chamber a galvanized iron strainer contains the screenings before they are removed from the compartment. A wier joins this compartment with the inlet trough.

The entrance of sewage to each of the compartments is controlled by a 6 inch sluice valve located in the center of the end wall just below the flow line. The scum boards are fixed at each end of the tank, extending two feet below the flow line and one foot above it. A movable baffle board is placed in each tank by which the direction of the flow in the tanks can be regulated.

Sludge is drained through an 8 inch line controlled by a sluice valve from each tank and is discharged by gravity onto the sludge bed. A low water line similar to that of the original tank centers at 4½ feet below the flow line. This drain is controlled by 6 inch sluice valves, and connects with the similar line from the other tanks.

Vent pipes allow the escape of gas from the tanks and manholes are placed in the roof for inspection and cleaning of the same.

The 10 inch by-pass runs from a manhole immediately above the sand filters to the manhole immediately below them, and will permit the effluent from the sprinkling filters to pass around the sand filters.

This addition makes it possible to more efficiently treat the sewage from the institution which at present amounts to between 50 and 60 thousand gallons a day. It is still necessary to divide the effluent from the tank between the sprinkling filters and sand filters, the former operating at a rate of 2,000,000 gallons to the acre each day and the latter 200,000 to the acre daily. It is intended to increase the size of the sprinkling filters and sand filters at a later date. The septic tanks now have a capacity of 50,000 gallons, allowing ample settling. The repairs to the lower section of the outfall sewer should eliminate nearly all ground water and materially reduce the flow in the sewer during the wet season. The entire elimination of seepage can hardly be expected as the sewer lies in land that is swampy during portions of the year. It was estimated that $2,400 would cover the cost of improvements. The labor has amounted to $2,364.02 which with the material bills will increase the total cost of the work to about $3,300.00. The increase in cost over the estimate is due to several causes; 700 additional feet of the sewer line was repaired and unusual difficulty was encountered in excavating for the underdrain at the side of the sewer line. In some places large rocks were encountered and great care was required to avoid injuring the sewer while removing these obstructions. Large boulders were encountered in excavating for the tanks and it was necessary to remove them by hand. It was also difficult to obtain first-class carpenters for the construction of the forms and the loss occasioned by the necessary employment of this inefficient labor added considerably to the cost of the work.

Basing the cost of the additions upon the cost of the original disposal plant, it will be seen that this work was completed with less expense than it could have been done by contract.

The results of weekly analyses of the effluent from the disposal plant show that the colon bacillus is entirely removed by the plant and that the total number bacteria reduced to from one to two thousand for the cubic centimeter.

Garbage Disposal Plant.

The garbage disposal plant at the institution has been operated continuously during the year under the general supervision of this division. The operation has been satisfactory at all times, the plant caring for the garbage without nuisance.

Garbage is collected daily from the various points around the institution and hauled to the plant. On each trip the teams carry a load of empty garbage cans back from the plant to the institution.

The daily average weight of garbage and sputum boxes burned is approximately 2,100 pounds and the coal used amounts to 1 pound for every 10 pounds of garbage.

The plant has about reached maximum capacity and any material increase in the size of the institution will necessitate the installation of another furnace unit or the adoption of some other method of garbage disposal.

New Highway.

The present main road leading from Mont Alto to the sanatorium is 20,000 feet long, from the Cumberland Valley Railroad station to the eastern part of the sanatorium. At the railroad station the elevation is 840, the sanatorium property averaging 1650, so that a vertical difference in elevation of 800 feet is overcome ascending the mountain. The first two miles from the railroad is fairly level, no grade exceeding five per cent. with the exception of a small hill near the State Forest Academy. From the foot of the mountain the road ascends on an average of 400 feet per mile with grades in some sections as high as 18 per cent. These heavy grades limit the quantity hauled by a team to such an extent that hauling is very expensive.

It was decided to construct a roadway up the valley of Brandon's Hollow Run leaving the main highway near the foot of the mountain and extending over the existing road along that stream for about 1,500 feet. This section of the road was originally constructed on a good rock bottom but is at present in only fair condition. From the upper end of this section of the road a new section is to extend along the stream on the west bank to a point one thousand feet north of the pipe line where it will turn across the creek over a masonry culvert and ascend the mountain on the east slope of Brandon's Hollow connecting with the old road at the top of the mountain.

This roadway will be 9,300 feet long rising 412 feet in that distance. The average grade will be under five per cent. and the maximum grade on three short sections will be 5.8 per cent. The road is designed for a working width of 14 feet and a total width, including ditches, of 20 feet. It will be constructed almost entirely on side slopes so that provision must be made for drainage from the upper slope. This will be accomplished by terra cotta drains under the road at frequent intervals. It is proposed to build the roadway as far as possible half in excavation and half in embankment, thus placing the center line very near the natural surface of the ground. The embankments will be securely bonded into the existing soil by stripping the surface and roughing the ground before filling. The side slopes on the excavation and embankment will be one and one-half to one.

The survey was completed and the estimate of cost prepared, including culverts and ditch works. The expense was estimated at $8,000, with an additional cost of $1,900 for placing broken stone on the surface, so that the total cost of 9,300 feet of roadway would be $9,900. It was recommended that the construction of the balance of this road, including culverts and ditches, be done by contract and the above estimate was based on this assumption. Broken stone can be placed by the State by days work at the cost given. It is estimated that sixty working days would be ample to complete the grading and with favorable conditions this time might be shortened.

The contract was advertised and bids received on July 18th. Six bids were submitted and are given in detail in the following table:

PENNSYLVANIA DEPARTMENT OF HEALTH: ENGINEERING DIVISION. BIDS RECEIVED FOR THE CONSTRUCTION OF ROADWAY AT MONT ALTO, PA.

July 18, 1910.			Riley & Fritz, Lancaster, Pa.		W. H Murphy & Co., Chambersburg, Pa.		Pitt Construction Co., Pittsburgh, Pa.		Keller & McManus, Lancaster, Pa.		W. F. Martin, West Fairview, Pa.		Geo. W. Miller, Baltimore, Md.	
No.	Description.	Quan.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.
1	Clearing and grubbing per 100 linear ft. of road, ----	93	50 00	$4,650 00	$100 00	$9,300 00	$25 00	$2,325 00	$18 00	$1,674 00	$15 60	$1,450 80	$110 00	$10230 00
2	Excavation per cubic yard, --	9,700	60	5,820 00	90	8,730 00	55	5,335 00	58	5,626 00	34	3,298 00	675	6,547 50
3	Embankment per cubic yard,	8,000	40	3,200 00	45	3,600 00	25	2,000 00	32	2,560 00	28	2,240 00	30	2,400 00
4	Cross drains, including connections, each, ------------	30	20 00	600 00	35 00	1,050 00	55 00	1,650 00	48 00	1,440 00	33 00	990 00	48 00	1,440 00
5	Stone culvert, lump sum, ----	1	1,200 00	----------	1,000 00	----------	1,500 00	----------	1,200 00	----------	900 00	900 00	1,100 00	1,100 00
	(Alternate) concrete culvert, lump sum, ----------------	1	1,100 00	1,100 00	900 00	900 00	1,000 00	1,000 00	900 00	900 00	1,000 00	----------	1,350 00	----------
6	Rock excavation, per cubic yard, ----------------------	100	2 50	250 00	1 40	140 00	250 00	250 00	1 00	100 00	1 00	100 00	1 25	125 00
	Total, ------------------	----------	----------	15,620 00	----------	23,720 00	----------	12,500 00	----------	$12300 00	----------	$8,978 80	----------	$21842 50

After carefully considering the bids it was decided that the Department could build the road more economically by day labor, accordingly all bids were rejected.

Work was commenced by the Department with a force of about twenty men on July 25 and continued with a force of from twenty to fifty until December 5th, at which time the roadbed, gutters, crossdrains and culverts had been completed ready for the stone surfacing.

The total cost of the work including the amount expended on the old Forestry road was $8,927.44. The total amount of excavation moved into embankment was 7,950 cubic yards and in addition it was necessary to obtain approximately 1,000 cu, yds. from borrow pits to complete the fills. These borrow pits were partly necessitated by the fact that about 750 cubic yards of loose rock encountered in the excavation was piled up at the sides of the road to be crushed for surfacing.

The increased cost over the estimate is due to the improving of the 1,500 feet of existing roadway; to the separating and piling of the 750 cubic yards of stone or surfacing; to the fact that it was found necessary to pay the laborers higher wages than anticipated and finally to the fact that approximately 350 cubic yards of solid rock was encountered as against the 100 cubic yards anticipated in the estimate.

The separating and piling up of 750 cubic yeards of stone for surfacing the road will materially reduce the cost of this work when it is undertaken.

The road is now open to the institution traffic and it is found that hauling over the road is not nearly as great a strain on teams as when using the old mountain road, especially during extreme winter weather, when the roadbed is apt to be very slippery.

Miscellaneous Work at Mont Alto.

Additions to the water lines were constructed to all new buildings, the staff building at the hospital and at the main camp and to the memorial chapel.

The sewer lines were also extended to the staff building at the main camp and the grease trap at the hospital building moved because of interference with the kitchen additions to that building.

The road leading to the sewage disposal plant from the ice pond was repaired and put in better shape for hauling.

About 750 lineal feet of cement sidewalk, 3 feet in width was laid from the administration building to the twin cottage. This sidewalk is four inches in thickness and composed of 3½ inches of concrete and a mortar top ½ inch thick. The walk is laid on a sub-base of well tamped cinders about eight inches deep.

Several miscellaneous surveys were made around the property for the location of buildings and for securing necessary data for improvements contemplated in the future.

B. Pennsylvania State Cresson Sanatorium

Property Survey.

The property in Cambria County consisting of 498 acres and donated by Andrew Carnegie, Esq., to the Commonwealth of Pennsylvania as a site for a Tuberculosis Sanatorium, was surveyed during the winter of 1909 and 1910, being completed by the Engineering Division during February of the latter year. This survey was based on the deeds for the property and on exact monuments and other land marks. The two corners from which the main lines of the survey were located are the two eastern corners of the tract. These corners are marked with stakes and stones and by old witness trees and not disputed by the abutting property owners. The only other base corner was the extreme western corner of the property marked by a stone set in the stump of a fallen poplar and by very old witness trees. There are several fence lines along the western portion of the property which indicate former property lines and which fit in very well with the survey as staked out. During the summer concrete monuments were set at corners, not already located by monuments, this permanently marking the limits of the property.

Water Supply.

The following facts were brought forth in a study made of the various sources available for a water supply for the sanatorium. The property is at an elevation ranging from 2,300 to 2,560 feet above mean sea level, and lies on the watershed divide between the Susquehanna and the Conemaugh Rivers, comprising the highest land in the vicinity. The tract lies on both sides of the Pittsburgh, Philadelphia and Huntingdon Turnpike and is bordered on the northwest by the Old Portage Road. At the intersection of the Old Portage Road with the turnpike is located the village of Summit, consisting of a group of houses which extends along both roads from their intersection for several hundred feet.

The tract is drained on the north by Bradley Run, on the east by Blair Gap Run and Adams Run which later joins the Juniata River. Several small streams rise in the western and southwestern part of the tract and flow to the Conemaugh River.

It was assumed in this study that the total population of the sanatorium would be 1,000 and that the water consumption would average 100 gallons per capita per day, which would mean a water supply of 100,000 gallons per day. It was further assumed that the buildings would be located on the high ground where it would be necessary to pump the water.

There are four possible sources of supply, springs, drilled wells, surface water and water company water.

The strata below the surface of the Carnegie tract dip between three and four per cent, north 27 degrees west. Sandstone, shale and fire clay superimpose the Upper Freeport coal which in the western portion of the tract near Summit lies 200 feet below the surface. There are several springs along the western slope of the main group being situated near the west central section whence they flow to the Conemaugh River. The elevation of the springs is about 2,300 and as the Upper Freeport coal outcrops near the eastern boundary of the tract the strata which feed the springs outcrop within the tract at correspondingly higher elevations so that the water storage for these springs is limited. During a prolonged drought these springs are practically dry. The strata which feed these springs appear to be of excellent water bearing formation and during the wet season would furnish an ample supply.

It might be possible by building dams on the streams from the springs to form storage reservoirs of sufficient size to supply the sanatorium during the dry season. This storage should be for 120 days water supply or 12,000,000 gallons. These reservoirs would receive all of the natural drainage from the property about the sanatorium which wouud probably militate against the use of this supply. During the drought of 1909 the flow of these springs was so small that it could not be measured and the creek beds appeared to be dry. Springs which outcrop at a lower level on adjacent property and which have a larger storage capacity flow continuously and a measurement taken on the creek below Plan No. 5 of the Old Portage Road just above the Upper Freeport coal showed a flow of 53,000 gallous per day. On the western side of the property near the turnpike there is a spring which supplies the Summit Hotel. This spring has a small flow which has never been known to fail. The rights of this water however belong to the hotel proprietor. On the north of the turnpike opposite this spring is another spring in the tract of land assigned by Mr. Carnegie to the Cresson Cemetery Association. This spring also is small but has never been known to fail.

The springs which furnish the water for the borough of Cresson are located in the extreme eastern part of the borough on the hillside one-half mile northwest of the State property. These springs outcrop approximately 300 feet above the Upper Freeport coal and have failed practically every summer so that the borough has been without water. They outcrop from strata similar to those which furnish the springs on the State property.

There are several dug wells and shallow and drilled wells in Summit village near the State property. They are fed by the same strata which furnish water to the springs previously mentioned and in most cases either fail completely during the summer or else furnish such a small supply of water as to be useless for sanatorium purposes. The water in all of the wells in this region is hard. Only one has been tested for capacity in the dry season, the result of which was that the removal of two hogsheads of water emptied the well. It required from 8 to 10 hours for the well to refill, indicating a limited supply.

Another group of wells near the State property lies one-half mile northwest of the property in the eastern part of the borough of Cresson at an elevation of 2,200 feet. The Upper Freeport coal at this place is at elevation 2,000. Three 6 inch drilled wells are located at this point and are 130, 160 and 171 feet deep. The two shallower wells have supplied not over 15,000 gallons a day during the dry season of 1909. The deeper well which was recently drilled was tested for 27 hours and gave a flow of 56 gallons per minute or 80,000 gallons per day. This test was made after the drought had broken. Immediately south of this group of wells on the hill near the turnpike and at elevation 2,231 is another 6 inch drilled well 193 feet deep which has been in use for several years. It was used by the water company during the drought of 1909 as an auxiliary for its supply and is estimated to have furnished 40,000 gallons per day. It will be noted that the two deepest wells in this section go to a depth of approximately 20 feet above the Upper Freeport coal. This would bring them into the Mahoning sandstone which is 90 feet thick in this section. In drilling a deep well on the Cresson water works property it was noted that there were several streams of water which entered the well between the surface and the final waterbearing stratum. The main supply, however, entered the well through the sandstone near the bottom. This waterbearing stratum outcrops on the extreme eastern portion of the State property so that there is a storage of water at this location of much greater extent than the storage on the western portion of the same property.

Another group of wells at Bens Creek, 5 miles southwest of Summit on the main line of the Pennsylvania Railroad were drilled to furnish the pumping station of the Standard Oil Company with water and have been very successful. The Upper Freeport coal outcrops near Bens Creek while under it are various strata intermingled with coal layers, several of which are being mined. Under this coal, which is 150 feet or more deep, is a 100 foot layer of Connoquenessing sandstone, below which are thick beds of soft red shale and under this, sandstone and silicious limestone. Two wells in this vicinity were drilled to the red shale and have proved very successful. One, which was 432 feet deep, upon completion overflowed at the surface with water and the other, which was 500 feet deep, did not overflow but water stood to within six inches of the surface. It is reported that recently a third well has been sunk at the Bens Creek pumping station to obtain additional water for condensing. This well is said to be 780 feet deep and it is stated that salt water and gas have been encountered.

The United States Geological Survey reports indicate that the red shale formation which supplies water for this group of wells underlies the State property and outcrops along the eastern slope near the Cambria Blair County line.

The outcrop is along the steep slopes of the mountain in this section, while east of Bens Creek the outcrop is along the top of the mountain in flat territory permitting better facilities for the storage of water. As the vein is reported to be 100 feet thick and as there is considerable storage in this stratum for wells which might be driven along the western side of the State property it is not improbable that a supply of water could be obtained from this source.

The borough of Gallitzin originally obtained water from drilled wells which it is reported were supplied by strata above the Upper Freeport coal similar to the Luther well near the State property and the deep well on the Cresson Water Company property. These wells failed when coal was mined nearby and the borough water has since been supplied by the coal company.

A thorough investigation was made of the water resources of nearby local streams. This investigation covered the following streams: Blairs Gap Run, Adams Run and Poplar Run on the east, Sugar Run and Bradley's Run on the north; Clearfield Creek on the west; Burgoon or Adams Run, and Christy Hollow Run which unites to form Bears Rock Run on the south of the Institution property. In all cases it was found that the flow of these streams diminished considerably during dry seasons, and that in most cases practically all of the water flow was being utilized by private water companies or such use was contemplated in the near future. In order to develop a supply from these sources it would be necessary to build large storage reservoirs to carry over the period of drought and the distance of such reservoirs from the institution would be considerable and their elevation much less than the elevation of the buildings, thus necessitating long pipe lines and heavy pumping charges.

The Summit Water Supply Company and the Cresson Water Company could both supply the sanatorium with water. The water main of the former reaches within three-quarters of a mile of the State property. If this supply were used it would be necessary to install a pumping plant.

The sources of the company are Bear Rock Run, three miles south of Cresson at an elevation of 2,344 feet and a series of reservoirs about 12 miles south of Cresson on streams which form the Conemaugh River. This company recently contracted to supply the borough of Cresson at wholesale rates, the borough to furnish the distributing pipes. The Bear Rock supply should be of excellent quality as only one or two dwellings are on the watershed.

The Cresson Water Company is planning to add extensively to its plant. The company intends to install a pumping plant on Clearfield Creek above the ice pond and to pump from a storage reservoir here to a distributing reservoir adjacent to the State property north of the highway. The elevation at this reservoir will be too low to supply the sanatorium by gravity and the supply is subject to pollution from various houses on the watershed.

It appears that from foregoing facts no spring supply is available and that in case a surface supply is used storage would be required.

It appears from the results of the wells at Bens Creek that a drilled well supply might be obtained by sinking wells to the red shale which should be about 500 or 600 feet beneath the surface on the State's property. Nearby results indicate that shallower wells would be inadequate for this supply. A supply from the stratum above the Upper Freeport coal might be considered for temporary use but judging from the experience of Gallitzin there would be constant danger of the supply failing owing to coal mining in the region.

In case an adequate supply is not obtained from these wells it would be possible to use water from one of the public supplies.

It is estimated that the cost of sinking a test well on the State property would not be excessive. This conclusion is based on data of the United States Geological Survey and two locations are chosen, one on the turnpike in the northwestern part of the property, which would be located conveniently for tapping the main of the Cresson Water Company and would also be located conveniently for extending a pipe along the turnpike from the Summit Water Supply Company's mains. The other site would be in the western portion of the tract near the streams which unite at Plane No. 5. The latter location would not be convenient for obtaining an auxiliary supply from the Cresson Water Company but could be combined with the water supply from the springs on the western border of the property and would also admit of the installation of a pipe line from the Summit Water Company's main.

It was decided by the Commissioner of Health to drill a 12 inch well to the red shale formation and in case of a failure to obtain an adequate supply, to purchase additional water from the Summit Water Supply Company. The site for the well was located on the extreme western part of the property near the Old Portage Road. The elevation of the ground here is 2,200 feet, which is sufficiently low to allow the delivery of water by gravity from the Summit Water Supply Company's main and in the future to receive by gravity a possible supply from the Christy Hollow Run source. This location is best adapted to drilling as the red shale is nearer to the surface at this point than at any other on the property and the geological map indicates that there is a better chance of obtaining a water supply from a larger exposed area of the stratum than if the well were drilled in the northern portion of the tract.

Pending the construction of a permanent water supply system a temporary plant was installed to furnish the contractors on the buildings with water. This consisted of a small gasoline driven pumping engine, located near the two main streams in the western part of the tract, and a wrought-iron pipe line from that point to an elevated spot near the building site, where a small wooden tank is located. One of the small pumping engines temporarily used at Mont Alto was shipped to Cresson, as well as 3,100 feet of three inch piping. This plant has been of sufficient capacity to supply the contractors with water for construction purposes.

Specifications for drilling the well were prepared and the contract advertised in the usual manner. On April 14th, five bids were received as given in the following table:

PENNSYLVANIA DEPARTMENT OF HEALTH, ENGINEERING DIVISION. BIDS RECEIVED FOR THE DRILLING OF WELLS AT CRESSON, PENNA.

April 25, 1910		Thos. B. Harper, Jenkintown, Pa.	The Ohio Drilling Co., Massillon, Ohio.	Samuel A. Louder, Cresson, Pa.	Est. of T. Geo. Ridpath, Philadelphia, Pa.	Kohn & Sons, Myerstown, Pa	Engineer's estimate.
		1.	2.	3.	4.	5.	6.
No.	Item.	Price Bid.	Price Bid.	Price Bid.	Price Bid.	Price Bid.	
1	12" well, 0' up to 300' deep inclusive, per vertical foot betweeen these depths,	$5 00	$3 25	$2 00	$8 00	$5 50	$2 00
2	12" well over 300' and not exceeding 500', per vertical foot between these depths,	6 00	2 50	2 10	9 00	5 50	1 75
3	12" well over 500' and not exceeding 700', per vertical foot between these depths,	7 00	2 50	2 25	11 00	6 50	2 25
4	12" well over 700' and not exceeding 1000', per vertical foot between these depths,	8 00	2 25	2 40	13 00	7 50	2 50
5	9" pipe for interior well lining in 12" well, per lineal foot,	1 30	1 12	1 80	1 50	1 30	85

The contract was awarded to Samuel A. Louder, the lowest bidder. The contract was signed May 11th, and the contractor notified to begin work on June 1st. Drilling was started on June third and the hole carried to a depth of 71 feet. A great deal of trouble was encountered, due to insufficient casing and consequent cave-ins. This hole was abandoned on August 5th and another started three days later about ten feet distant from the first location. Fair progress was made until August 20th when the work was abandoned by the contractor from lack of funds. The well was then at a depth of 94 feet.

On August 22nd the bond holders, the United States Fidelity and Guaranty Company were notified that the contractor has abandoned the work and that under the terms of the contract they were to continue the same. The bonding company promised to investigate the matter but did not make any definite efforts to continue construction. Accordingly, on September 2nd, at the expiration of ten days time as called for in the contract, the Commissioner of Health took over the equipment left on the ground by the contractor and continued the work by day labor.

Drilling was carried on almost continuously until October 12 where the well was left at a depth of 239 feet. On this day the jars on the string of drilling tools gave way leaving the lower part of the tools in the bottom of the well. The work of fishing for these tools was immediately undertaken and they were recovered and drilling resumed on October 31st. From this time until the end of the year the work was continued, considerable trouble was experienced with breakdowns in the drilling machine. On December 31st the well was at a depth of 345 feet. While the work at the wells was being carried on at Cresson plans were prepared for the permanent water supply of the institution. These plans included a deep well pump for lifting the water from the well, a forty thousand gallon circular concrete receiving reservoir, and a pump station containing two high pressure electric driven triplex plunger pumps having a total capacity of 300,000 gallons per 24 hours, for forcing water from the receiving well through a six inch cast iron main to the institution buildings on top of the mountain. The plans also included pipe lines leading from the springs on the mountain side to the receiving well so as to make use of this during wet weather and avoid running the deep well pump except when necessary.

Sewerage.

An investigation was made during the summer to determine the best method of disposing of the sewage from the institution, and it was apparent that there were two possible methods of draining satisfactorily from the building site: First to construct a sewer line connecting with the Cresson borough sewers and, second, to construct a sewage disposal plant on the property and discharge the effluent into one of the streams flowing from the same. The former would be somewhat cheaper for the present, but would involve a joint sewage disposal project, sometime in the future, when it becomes necessary for the borough of Cresson to purify its sewage. It was, however, not deemed advisable to consider this proposition but to prepare plans for a sewage disposal plant on State property. A site was chosen but until the end of the year neither the disposal plant nor the sewers had been definitely approved and no work had been done.

Electric Power Plant.

It was decided to investigate the possibilities of an individual electric power plant to furnish current for power purposes and for lighting the buildings. A consulting electrical engineer was selected for this investigation and he reported very favorably on the matter.

The following table is an estimate of the number of lights and size of various motors required:

1 ward building,	340-16 c. p. lamps.
1 ward building (proposed),	340-16 c. p. lamps.
1 administration building,	95-16 c. p. lamps.
Dining building,	275-16 c. p. lamps.
Corridor,	62-16 c. p. lamps.
Corridor (proposed),	62-16 c. p. lamps.
Laundry building,	65-16 c. p. lamps.
Barns and chicken house,	20-16 c. p. lamps.
Pump plant,	12-16 c. p. lamps.
Ground lighting,	35-100 Watt series Tungsten lamps.
Washing machinery at laundry,	5-H. P. motor.
Collar ironer at laundry,	3-H. P. motor.
Mangle at laundry,	3-H. P. motor.
Extractor at laundry,	3-H. P. motor.
1 fan,	1-H. P. motor.
1 dish washer,	2-H. P. motor.
1 15-ton ice machine,	30-H. P. motor.
Coal handling machinery,	10-H. P. motor.
Carpenter shop,	10-H. P. motor.
Potato paring machine,	2-H. P. motor.
3 motors at pumping plant,	75-H. P. motor.
2 passenger elevators,	30-H. P. motor.
2 freight elevators,	20-H. P. motor.

Nothing had been definitely decided about this work at the end of the year 1910, although information and estimates had been submitted which will be included in the description of the final installation of this plant.

Miscellaneous Work.

During the year a good deal of miscellaneous work was performed by the Engineering Division. This included cutting the trees and grubbing the stumps from the site of the main buildings; the construction of a macadam road 3,500 feet in length leading from the highway to the main buildings, and starting work on the chicken coops for the institution.

The cottage at the foot of the mountain on the grounds of the Cresson Springs Hotel which had been presented to the Department by Mrs. B. F. Jones was opened and used by the resident engineer as a residence.

C. State Hospital at Wernersville

Sewerage and Sewage Disposal.

The Legislature of 1909 granted the trustees of the State Hospital for Chronic Insane, located in Berks County, near Wernersville, an appropriation of $30,000 for additions to the sewer system of the institution and for the construction of a sewage disposal plant.

The contract plans for this work were prepared by the State Department of Health and the contract awarded and construction work started on October 10, 1909. The trustees of the institution appointed a consulting engineer to take direct charge of the construction work, this Department, however, retaining an advisory oversight of the construction. The details of the sewer system and sewage disposal works were given in the annual report of this Department for the year 1909 as well as a description of the work constructed during that year. Owing to the severity of the winter, work was discontinued on December 31, 1909, until the advent of warmer weather in the spring.

On March 23, 1910, the contractor was notified that the weather had sufficiently moderated to allow the completion of the work. He accordingly resumed operations on the contract and the work was practically completed by August 31, 1910. During the entire summer the friction between the institution authorities and the contractor, mentioned in the 1909 report, was still apparent. This friction undoubtedly delayed the progress of the work and had its effect on the quality of the same.

The specifications required that on completion of the settling tanks, siphon chamber and solution tanks in the chemical mixing house, the same should be treated with a water-proofing solution of soap and alum and that these tanks when filled should not show a drop in elevation of the water level of more than one inch in 24 hours. The tanks in the chemical cleaning house and the siphon chambers were within the prescribed limits of the specifications as regards watertightness but on the settling tanks a test on August 20th showed the following drop in water elevations:

Tank A—12 inches in 24 hours.
Tank B— 6 inches in 24 hours.
Tank C— 6 inches in 24 hours.
Tank D—was not tested on account of lack of fill on the north side of the same.

During this test it was apparent that the sluice gates leading to the sludge drains leaked and that there was leakage through floor joints. These valves were adjusted and the cracks between the joints in the concrete floors were refilled with a cement mortar. The embankment was placed behind the wall of Tank D and on August 31st the test made on this tank showed a drop in water level of 18 inches in eight hours. Tank A was again tested on the same day and showed a drop in elevation of 26 inches in 24 hours. The leakage in tank A was undoubtedly due in part to leakage of the sludge valve. These tanks were then drained and on examination it was found that the expansion joints had slightly opened and that a crack appeared along the south wall of tank D. On September 3rd the contractor stated that he could do nothing more towards making the tanks watertight and left the job, together with all laborers. On September 10th the superintendent of the institution with the consulting engineer and members of this Department held a consultation and made an examination of the work. At this time it was found that the expansion joints on the north wall of tank D had reopened at the bottom but that there was no large crack perceptible which would account for the leakage. Tanks B and C did not show cracks and tank A could not be examined because it was partially filled with water. At this consultation the authorities of the institution decided that the contractor had definitely abandoned the work and decided to notify him of the fact and to proceed themselves to make the tanks waterproof.

A thorough examination was made of the concrete on the bottoms of the tanks and it was found that this concrete was porous in several places and indicated that it had not been properly and thoroughly mixed before placing in the floors. In view of this fact it was decided that some sort of waterproof coat should be applied to the floors and underdrains in the tanks. The institution contracted with Wm. H. Dechant, of Reading, to do this work. The tank floors were first thoroughly cleaned and then were given an application of hydrex waterproofing compound covered by a layer of hydrex felt and a one inch coating of cement mortar. This waterproofing layer was extended up the side walls of the tanks for a distance of about six inches. The drains in the floors of the tanks were treated in the same way excepting that in these places a strip of metal lathing was imbedded in the mortar to hold the same in place on the side walls of the drains. During this work which was performed in October, November and December, 1910, and the first part of January, 1911, the fees for the consulting engineer were included in the cost of waterproofing. The total cost of this work was $726.74, which it was decided should be charged against the contractor. On the completion of this waterproofing it was found that tanks A and B were tight within the limits prescribed by the specifications but tanks C and D still showed a leakage of about six inches per 24 hours. On further examination it was found that the expansion joints along the walls had opened slightly and that a crack had appeared along the junction of the floor and walls. The trustees of the institution and consulting engineer were of the opinion that this crack was due to settlement of the foundations of the side walls. During construction several soft places and small springs were encountered immediately under the side wall footings of tank D. In view of these facts they decided that this leakage was partially due to settlement of the walls and could not be entirely blamed to careless work on the part of the contractor and it was decided to accept the work even though these two tanks still leaked and to reinforce the same with concrete under-pitting and buttresses placed against the outside wall of tank D, thus preventing any further movement of the same. This work has not been undertaken because the institution preferred to wait until a final settlement was obtained by the contractor.

The value of the contract work completed during 1910 as well as the extra work made necessary by minor changes in the plans during construction is as follows:

No.	Description.	Quantity.		Unit Price.		Amount.
1	Concrete, class A,	314.66	cu. yds.,	$7 25	per yd.,	$2,231 29
2	Concrete, class B,	144.00	cu. yds.,	6 70	per yd.,	964 80
3	Concrete, class C,	345.78	cu. yds.,	5 00	per yd.,	1,728 90
4	Steel reinforcement,	34,993	lbs.,	0 035	per lb.,	1,224 76
5	Rib metal, No. 4,	152	sq. ft.,	0 065	per sq. ft.,	9 88
6	Rib metal, No. 6,	4,696	sq. ft.,	0 05	per sq. ft.,	234 80
7	Sand,	504.8	cu. yds.,	2 00	per cu. yd.,	1,009 60
8	Siphon,	1	only,	-------	Lump sum,	140 00
9	C. I. grating,	3,196	lbs.,	0 04	per lb.,	127 84
10	Appurtenance for settling tanks.	4	sets,	-------	Lump sum,	600 00
11	C. I. manhole frames and covers.	39	pairs,	6 25	per pair,	243 75
12	Manhole steps,	231	only,	0 20	each,	46 20
13	12" supply to sprinkling filter,	106.5	lin. ft.,	1 10	per ft.,	117 15
14	18" half tile,	105.5	lin. ft.,	0 35	per ft.,	36 93
15	6" half tile,	6,100	lin. ft.,	0 06	per ft.,	366 00
16	C. I. risers in sprinkling filter.	50	only,	2 50	each,	125 00
17	Chemical dosing house,	1	only,	820 00	lump sum,	820 00
18	Orifice box,	1	only,	50 00	lump sum,	50 00
19	Chemical mixing tank,	1	only,	50 00	lump sum,	50 00
20	Cast iron pipe,	48.61	tons,	37 50	per ton,	1,822 88
21	Cast iron standard specials,	10,647	lbs.,	0 065	per lb.,	692 06
22	Cast iron flanged specials,	8,713	lbs.,	0 075	per lb.,	653 48
23	12" t. c. pipe,	131	lin. ft.,	0 40	per ft.,	52 40
24	10" t. c. pipe,	1,911	lin. ft.,	0 27	per ft.,	515 97
25	8" t. c. pipe,	184	lin. ft.,	0 20	per ft.,	36 80
26	6" t. c. pipe,	663	lin. ft.,	0 14	per ft.,	92 82
27	Sprinkling nozzles,	50	only,	3 75	each,	187 50
28	Pump and engine,	1	only,	-------	Lump sum,	700 00
29	Hand pump,	-------	-------	-------	-------	-------
30	2" water line,	4,322	lin. ft.,	0 225	per ft.,	972 45
31	8" hub gate valves,	1	only,	21 00	each,	21 00
32	6" hub gate valves,	5	only,	15 00	each,	75 00
33	4" hub gate valves,	-------	-------	19 00	each,	-------
34	4" flanged gate valves,	10	only,	10 00	each,	100 00
35	⅝" brass valves,	10	only,	1 00	each,	10 00
36	8" sluice gate valves,	5	only,	30 00	each,	150 00
37	6" sluice gate valves,	8	only,	25 00	each,	200 00
38	8" shear gate valves,	1	only,	$25 00	each,	$25 00
39	6" sheet gate valves,	4	only,	23 00	each,	92 00
40	Sewer rods,	400	lin ft.,	-------	Lump sum,	100 00
41	Concrete manholes,	104.4	vert. ft.,	6 25	per ft.,	652 50
						$17,328 76

Labor and Materials for Patching Wall of Sprinkling Filter Injured by Blasting.

2 hours carpenter @ 35c,	$0 70	
3 hours foreman @ 40c,	1 20	
11 hours labor @ 15c,	1 65	
4 bags cement @ 35c,	1 40	
	$4 95	
15%,	74	
		5 69

Labor and Materials Moving 10″ Sludge Line.

30 pounds lead @ 5c,	$1 50	
2 hours caulker @ 30c,	60	
2 hours helper @ 15c,	30	
Labor, moving pipe, Dec. 2 times, ½ hour each, total force on payroll,	3 35	
Labor, moving pipe, in May,	30	
	$6 05	
15%,	91	
		6 96

Labor and Materials Replacing 3 Joints at Manhole No. 9.

2 hours caulker @ 30c,	$0 60	
2 hours helper @ 15c,	30	
30 pounds lead @ 5c,	1 50	
	$2 40	
15%,	30	
		2 76

Labor Relining Forms on North Side Sprinkling Filter, Account Blasting.

2 hours carpenter @ 35c,	$0 70	
4 hours carpenter @ 30c,	1 20	
4 hours labor @ 15c,	60	
	$2 50	
15%,	38	
		2 88

Labor and Materials for Baffle Boards in Settling Basins.

Bill for angle irons,	$9 00	
Bill for cypress,	4 25	
Cartage and freight,	1 25	
1 bag cement,	35	
10 hours extra labor, carpenter,	3 50	
10 hours extra labor, cement finisher,	3 00	
	$21 35	
15%,	3 20	
		24 55

Labor and Materials Changing Elevation of Track in Settling Tanks.

10 hours carpenter @ 30c,	$3 00	
6 hours helper @ 15c,	90	
	$3 90	
15%,	59	
		4 49

Labor and Materials Cutting and Repairing Concrete Around 6″ Sluice Gates.

10 hours finisher @ 30c,	$3 00	
3 hours labor @ 20c,	60	
	$3 60	
15%,	54	
		4 14

Labor and Materials for Furnishing 4 Hydrants.

Manufacturers' bill,	$26 00	
Labor setting same,	7 50	
Freight and cartage,	1 50	
	$35 00	
Deduct four 1½″ valves displaced,	3 76	
	$31 24	
15%,	4 69	
		35 93

Materials for Extra Specials.

1 10″x8″ vitrified pipe tree,	$1 50	
Freight on extra pipe and specials, 3 tons @ 60 c,	1 80	
	$3 30	
15%,	50	
		3 80

Labor and Materials for Re-drilling 4″ wall casting.

8 ft. 2″ galvanized iron pipe @ 16c,	$1 28	
3 fittings,	60	
2 bags cement,	70	
2 hours finisher @ 30c,	60	
4 hours laborer @ 15c,	60	
	$3 78	
15%,	57	
		4 35

Labor and Materials for Stopping Leak in Settling Basin.

Bill, Elkanial Ruth,	$17 30	
Drayage and handling,	2 75	
	$20 05	
15%,	3 00	
		23 05

Labor and Materials furnishing Doors and Screens for Screen Chamber.

Bill for cal. iron pl. screens,	$13 63	
Bill for 2 cal. steel doors,	21 00	
Bolts,	50	
10 hours finisher,	3 00	
10 hours helper,	1 50	
Freight and drayage,	2 60	
	$42 23	
15%,	6 33	
		48 56

Contractor's Material Used by State Institution.

6 ft. 6″ vit. sewer pipe @ 9c,	$0 54	
22 ft. 10″ vit. sewer pipe @ $0.1725,	3 80	
26 ft. 12″ vit. sewer pipe @ $0.23,	1 38	
52 ft. 8″ vit. sewer pipe @ 0.12,	6 24	
78 ft. 10″ vit. sewer pipe @ 0.1725,	13 46	
0.97 tons c. i. pipe, @ $25.00,	24 25	
	$49 67	
15%,	7 45	
	$57 12	

Deduct for Specials in Drop Manhole.

1 6″ ¼ bend vit. pipe,	$0 35		
1 6″ tee,	55	90	56 22
			$17,552 14

Extra Brick Work on Dosing House.

0.94″ M. brick @ $33,	$31 02	
15%,	4.65	
		35 67

Labor and Materials Cutting Out and Resetting Thimbles for Valve Stems in Roof of Tanks.

1½ hours fitter @ $0.45,	$0 68	
1 hour finisher @ 0.30,	30	
6 hours helper @ 0.20,	1 20	
26 pounds 4″ c. i. pipe @ $0.015,	39	
	$2 57	
15%,	39	
		2 96
		$17,590 77

Deduct Cost of Waterproofing Settling Tanks.

Wm. H. Dechant, labor, supervision, etc.,		$416 13	
Sand, 13,595 tons @ $1.15,		15 63	
Cement, 61,50 bbls. @ $1.22,		75 03	
Coal, pea, 2.72 tons @ $3.00,		8 16	
Diamond No. 26 metal lath, 128 sq. yds.,		20 48	
Hydrex felt, 400 ft.,	$5 00		
Hydrex compound, 217 gal.,	36 89		
R. L. Wilson, applying hydrex,		27 00	
Mops, 4,	3 00		
		44 89	
Gasoline, 55 gallons,		6 33	
Geo. H. Maurice: Oct., 1910,	$41 76		
Nov., 1910,	25 04		
Dec., 1910,	50 04		
Jan., 1911 (½ bill),	16 05		
		132 89	
		$746 54	
Less:			
400 ft. hydrex felt,	$5 00		
40 gallons hydrex compound,	6 88		
2 days time,	8 00	19 80	726 74
			$16,864 03
Deduct previous payments,			16,418 51
Balance,			$445 52

Correct, July 28, 1911. Approved:

The disposal plant was placed in operation about October 1, 1910, and has been operated continuously since that time. Settling tanks C and D have not been in use, due to the leakage in the same explained in detail above.

When the plant was placed in operation it was found that the six inch cast iron line would not carry the maximum sewage flow from the institution. According to the computations this siphon line should have a capacity of 360,000 gallons with a velocity of 2.5 feet per second or a capacity of 320,000 gallons per day with a velocity of 2.84 feet per second. On October 10, 1910, weir readings were made on the sewer line and it was found that the average flow of sewage per 24 hours was 230,000 gallons and that the rate from 6 o'clock in the morning until 6 o'clock in the evening was about 260,000 gallons per 24 hours and that the siphon line instead of having the capacity which it was figured, had apparently about one-half of this capacity. The institution, in order to make sure that there was no stoppage in the line, drained the siphon and thoroughly cleaned the same but without success. The only reason which can be assigned for this decreased capacity of the siphon line is that there may be an air trap at some point along its length. As a trap or other obstruction could not be located in this line, the institution decided to parallel the existing siphon line with another six inch siphon. This work is now being done by the inmates of the institution.

As noted in the first part of the report the contractor was subjected to considerable delay because of the excavation not being finished at different points in the work, and although the contract at the time the contractor abandoned the work had not been completed within the time called for by the specifications, the trustees of the institution decided not to make any deduction for liquidated damages, as the delay caused by the excavation not being completed could not be accurately estimated from such records as had been kept during the construction. They decided, however, to deduct the charge of the consulting engineer during the period of waterproofing the tanks, as this charge was clearly definable and was an extra charge which the institution would not have been called upon to assume had the tanks been made watertight by the contractor.

The contractor has claimed that the leakage in the settling tanks was not in any way due to faulty construction but was entirely due to a settlement of the foundations and subsequent opening of the expansion joints in the walls and floors, the institution claiming on the other hand that inasmuch as the concrete in the floors of the tanks was found to be porous, improperly mixed in some places, and contained particles of foreign matter, at least around the sludge valves, that this leakage was due in great part to faulty work. The institution authorities also feel that the work is not of the highest order throughout the plant, especially in reference to the alignment of the walls and finishing of the concrete. This carelessness on the part of the contractor does not give the disposal plant as finished and satisfactory an appearance as could be desired. Numerous conferences have been held with the contractor in an endeavor to secure a final settlement on the question of payment of the cost of waterproofing, mentioned above. These conferences have been without avail and at the end of the year 1910 the dispute between the institution authorities and the contractor had not yet been settled. The institution authorities are desirous of making the final payment to the contractor and having the work approved by this Department as required in the specifications.

Since placing the disposal plant in operation in October, 1910, careful records of operations have been kept and forwarded weekly to this Department on blanks prepared for that purpose. The effluent from the several units has been regularly tested by the methalene blue putrescibility method which showed that the effluent from the settling basins and the creek below the outlet of the disposal plant has at all times been stable and non-putrescible. In addition to the methalene blue tests samples for bacteriological examination have been taken weekly in bottles furnished by this Department and forwarded to the laboratories for examination. In practically every case the bacteriological examination showed that the total number of bacteria in the final effluent had been reduced to a very small number and that the colon form had disappeared entirely. The total number of bacteria in the creek below the effluent pipe in many cases is less than the total number in the stream immediately above the point of discharge of the effluent. No objectionable odors have been given off from the plant and the institution authorities are very much gratified with the results.

It is hoped that they will effect a settlement with the coutractor during the coming year after which they will proceed to clean up the ground around the disposal plant, sod the slopes and otherwise improve the appearance of the immediate surroundings of the disposal plant.

D. State Hospital at Polk

Sewage Disposal Plant.

A description of the sewage disposal plant for the State Institution for Feeble Minded of Western Pennsylvania was given in the annual report for 1908 and 1909 in which it was stated that the contract for the plant was awarded, by the advice of the Commissioner of Health, to Thomas Barrett of Wilmerding, Pa., on January 28, 1909. A formal notice to begin work on the contract on April 15th was sent to the contractor by the board of trustees. The contractor did not prosecute the work with proper speed, so that instead of finishing on contract time, the work carried over into 1910.

The contract provided that if the work increased beyond the amount specified a proportional time allowance would be made, and further that upon notice being sent by the contractor to the board of trustees, of the existence of a cause beyond his control tending to delay the completion of the work, an extension of time would be granted, providing the contractor would pay the cost of engineering made necessary by such extension. It was further stipulated that any forfeiture consequent upon delay by the contractor, would not be in the nature of a fine but would represent admitted and liquidated damages which the State would suffer because of the delay. There were six rainy days, for which allowance was made and an extension of time granted by notice from the trustees. The contractor was delayed in ordering 1,000 cubic yards of filtering stone until the amount appropriated for the institution had been fixed. An allowance of 3½ days representing this lost time was made. These allowances extended the time for completing the contract to July 29th, but as above stated, the work was still under way at the end of 1909 and in all 276½ days expired before the completion of the work, which according to the unit stated in the contract represented damages amounting to $4,155.

The delays on this work were ascribed to the following causes: Inexperience of the contractor in handling work of this character, incompetent foremen, and lack of sufficient workmen. Daily records kept by the engineer showed in detail weather conditions, labor employed and progress made. These records show that at times the force of carpenters employed was insufficient for the construction of forms for the various structures, so that the placing of concrete was oftentimes delayed and this cause in particular throughout the work tended greatly to delay progress. Notices were frequently served upon the contractor, stating that he was behind in his work and urging him to proceed more rapidly. On July 19th the bonding company and the contractor were notified that the contract time had expired but that permission would be granted for the contractor to complete the work provided that the admitted and liquidated damages were deducted from the estimates. On September 7th the contractor petitioned the trustees to further extend the contract time setting forth his reasons in detail as outlined hereinafter. The petition was referred to the State Department of Health with the request that the contractor be leniently dealt with and recommending that the time limit of the contract be extended after deducting the cost of engineering, provided the contractor should show due diligence and complete the works in a satisfactory manner. Therefore the cost of engineering from July 29, 1909, to May 22, 1910, was calculated and amounted to $1,350.32, which included a portion of the time of the resident engineer, full time of inspector on the work and part time of the other inspectors temporarily assigned to the work, as well as traveling expenses of the Engineer of Designs and Construction between Harrisburg and Polk.

The contract further provides that extra work would not be allowed unless ordered in writing, the price for the same to be agreed upon in advance or as provided in the contract on a basis of cost plus 15%. It is a fact that extras were less on this work than is ordinarily the case. They are outlined below.

Piping changed in places to avoid conflicts, cypress doors, open drains laid around the foot of the septic tanks, heavier foundations under the siphon chamber, wire used for holding concrete to "I" beams in settling tanks, additional small g. i. pipe, rearrangement of dosing house doors, two additional courses of brick in pump house, changing screens and placing a two inch gate valve. The total extras amount to $128.15. Several other items were paid for under unit prices such as concrete, reinforcement, excavation, etc.

At the request of the contractor a change in the design of the settling tank roof was made to facilitate his work. A change in alignment was ordered, which, as it developed by accurate measurement, made no variation in quantity, the shortening of the sewer line off-setting the cost of an extra manhole. This change was ordered before the contractor had begun on this portion of the line. By doubly reinforcing a section of the settling tank wall, it was found possible to omit a portion of the embankment without increasing the cost of the work. This change was made before the contractor had ordered his material. No rock was encountered in the excavation and no difficulty was experienced in holding the sides of the excavation, so that very little trench bracing was needed.

The material furnished in most instances was of good quality and the result of placing it was satisfactory as long as the contractor followed the instructions of the engineer on the work, but he failed to do this several times and the work had to be condemned and replaced.

The largest single rejected item was an expansion joint in the concrete which the contractor refused to place in the customary manner by remelting the asphaltum after it was poured. The sprinkling filter walls were built in sections between buttresses but the joint at the base of the wall had to be omitted as the contractor could not show a satisfactory way of placing the reinforcement in the footing. The settling tank wall was poured in sections between vertical expansion joints in continuous construction from base to top, as shown on the plans. The contractor wished to place horizontal joints and to work at several sections at the same time. This was not allowed because a line of weakness would have developed in the wall, at a point where the maximum stress occurred, as the reinforcement was placed vertically. The layout for pumps and engine was to be drawn up after the contractor's plan for pump and engine had been accepted. The contractor had several months before starting work to determine upon the machinery and to secure working drawings for his layout but complete data were not submitted by him until the first week in July, a few days before the time for the completion of the contract. Working drawings and layout were immediately completed and furnished the contractor on the 17th of July. This machinery was not satisfactorily placed until the spring of 1910. The contractor caused another delay by submitting samples of sand which could not be approved according to the specifications and a satisfactory sample was not obtained until August 19th, several weeks after the expiration of the contract period. Sand was not placed in the sludge bed until the middle of September. Sprinkling filter stone was not furnished until the middle of August, a month after the expiration of the contract time.

The plant was considered in condition to make a final test by the end of January, 1910. This test was made and with a few exceptions the plant was found to be acceptable. The contractor was notified to proceed with the unfinished parts and a final test and inspection was made by the chief engineer accompanied by the Engineer in Charge of Designs and Construction on March 11th. At that time many details were found to be incomplete and the contractor was so notified. He finished these on May 2nd and one week later the work was re-inspected and conformed with requirements of plans and specifications, so far as could then be determined.

Nine payments were made, the final one being up to and including May 23rd, 1910, which estimate follows:

It will be noted that the total cost of the plant was $28,189.90, while the engineers' estimate based on the contractor's unit prices was $27,447.60, which is as close as usual in contracts where excavation and pipe work is more or less approximated and where these items are usually increased, when the work is actually constructed.

As stated, the contractor presented a petition to the trustees requesting an extension of time on September 8, 1909, in which his claims were set forth as follows:

Pittsburg, Pa., September 7, '09.

To the Trustees of the Institution for Feeble Minded, of Western Pennsylvania,
situate at Polk, Venango County, Penna.

Gentlemen:

I am at the present time constructing a sewage disposal plant for the Institution for Feeble Minded of Western Pennsylvania in accordance with a contract entered into the 28th day of January, 1909, which contract provides that the work was to be commenced within ten days of notice to begin work and finished within seventy working days thereafter.

The notice to begin work was dated the 15th day of April, 1909, which would make the 25th day of April, 1909, the date for the beginning of the work, and the time for the completion of the work would expire on the 18th day of July, 1909.

From the time the work was completed until the present time, there have been a great many rainy days in which it was impossible to work and many more days in which the ground was too wet to do any work. At times it has been impossible for me to get competent men to work on the job.

The principal cause for delay has been, however, the changes in the plans made by order of the engineer in charge of the work, which cause in many cases a total derangement of the plans for carrying on the work and has made it impossible for me to complete the job at this date. The chief changes in the plans are as follows:—

The plans for the concrete work for the filter beds show joints between the foundation and the upright walls. This is the usual way to put in such walls, so that the footing courses can be put in first and will then act as a support for the forms for the walls and buttresses. The engineer, however, insisted that the forms for the walls should be erected before the footing course was put in. This caused great expense and delay as the forms had to be placed on piers and supported by wrought iron pipes while the footings course was being placed. It also required a rearrangement of the forms for the concrete.

The plans also show the roof of the distributing chamber to be constructed separately from the walls, but the engineer insisted, that it be constructed at the same time, thus causing additional complication of forms.

Changes in the forms for the manholes were also made that caused additional expense and delay.

The settling tanks were also ordered built 4″ higher than was originally intended and shown on the plans. The plans also show that expansion joints in settling tanks were to be in the outside walls of the filter only. The engineer, however, ordered expansion joints in the interior walls also, which is a radical departure from the plans.

Additional joints were also required at the junction of the interior walls with the end walls at a point where there is a great accumulation of reinforcing rods. These joints could have been made at a point in the walls midway between the interior walls, which would have entailed less expense and delay and have been better practice from an engineering point of view.

Other causes of delay in completing the work are as follows:

The engineer in charge ordered the walls to be filled from bottom to top in one day. This made it necessary to construct the forms complete from bottom to top before placing any concrete. As the erection of such forms is a matter of several days during which the mixer has to be idle, it can be readily seen that it was impossible to construct the work in the time required. Had the engineer in charge allowed the forms to be constructed and filled in small sections in height, and there was nothing in the plans and specifications to show to the contrary the work could have been constructed and completed within the time set.

Other changes from the plans and specifications were the requirements that the joints in the floor of the filter beds should be burnt in with a gasoline torch. This was not required in the specifications and has never to my knowledge been required in such work.

The entire amount of material for the filters was not ordered to be put in until the latter part of May.

Changes in the reinforcing material and the beams were made.

Extra length of galvanized iron pipe was ordered put in.

The location of the sewer from the ice pond to the disposal plant was changed so that the maximum cut, instead of being 7.5 feet as shown on the plans, was as high as 10.5 feet in depth. This caused additional delay for the reason that when a sewer trench is less than seven or eight feet, it is not necessary to make two shovelings to get the material to the surface, but when it it more than seven or eight feet, two shovelings are necessary and the time and expense are greater.

There were no plans shown for the piping system at the pump house and I supposed that the plans would be the usual arrangement of pipes at such places. The engineers prepared a system of piping for the plant which is dated July 12th but was not sent to me until July 17th. The plan was subsequently changed on July 27th to avoid interference with the sewer lines. The arrangement is much more complicated than I had reason to suppose and instead of standard fittings, a large amount of special work was required.

The foregoing is set forth in order that your honorable body may have submitted to it in writing at least a portion of the reasons why it has been impossible for me to complete the contract and will be impossible for me to do so before October 15, 1909, and while there are many other good reasons why the work has been delayed, yet I am convinced that those herein set forth are sufficient to warrant the granting of my request.

It will be impossible to use the sewer being constructed by me under this contract until the completion of another sewer being constructed by me under another contract, which other sewer is to be completed by the day of October, 1909.

I respectfully request your honorable body to extend until October 15, 1909, the time for my completing this contract that you authorize, empower and direct the engineer in charge to furnish me with an estimate of the entire work completed by me to this date without any deductions for delay in completing the contract; and that you authorize, empower and direct the engineer to furnish from time to time estimates of the amount of work completed by me without deductions for non-completion of the contract until October 15, 1909.

(Signed) Thomas Barrett.

The statements in this petition are exaggerated and in no way excuse the delay in the work. The weather conditions were extremely favorable during the entire period of the contract except during the days for which an allowance was made. The increased cost of sprinkling filters is not correctly blamed upon the engineer, as the contractor could not furnish a method for constructing the footing course separately in a satisfactory manner. The customary method for this construction was therefore resorted to. Not only was no objection made by the contractor to the method of constructing the roof of the operating gallery but he first made the request to be allowed to do so, this method being more economical. The increased height of the settling tank was permitted by request of the contractor as a convenience to him and the expansion joints in the interior walls were clearly shown on the plans and were constructed in accordance with the same. Additional joints at the junction of the interior and end walls were necessary as the contractor had an insufficent force to build one section at a single pouring, without placing the joint at this point, and it would have been dangerous to have allowed these walls to be built with horizontal joints in violation of the specifications. It was therefore necessary to complete each section from top to bottom at one pouring. It was necessary to burn the asphaltum joints as it was the only way in which the contractor could do the work satisfactorily to the engineer. Although the statement as to delay in ordering filtering stone is correct, and a time allowance had been made, it is true that, after receiving this order, nothing was done toward crushing the stone for several months. Changes in reinforcing material and the ordering of extra material were made in accordance with the contractor's suggestions, time being given to furnish the same. The change of sewer did not increase the cost of work as shown by careful measurement and calculations, the average depth of the sewer being less than according to the original plan. The delay to the contractor in obtaining the piping layout for pump and engine, was due to failure of the contractor to furnish the information required until the first part of July, although he had six months in which to obtain the data. It will therefore be seen that no logical reason has been advanced by the contractor for an extension of time.

Liquidated damages on this contract would have amounted to over $4,000.00 if collected strictly in accordance with the terms of the contract. Undoubtedly the State has suffered a greater amount of damages than is represented by this amount, as the institution has been annoyed by the continuation of the work throughout the winter and has been unable to use the new plant for the treatment of its sewage.

The officials feel, however, that the contractor should be relieved of the payment of all liquidated damages except the actual cost of engineering and the final estimate has been made out with this object in view.

A special operator familiar with the details of the work was put in charge of the plant. Apparatus for making stability tests of the effluent from the various units was purchased. Daily records of operation have been furnished to the Department of Health. These stability tests indicate that the effluent discharged into the creek has at all times been stable and non-putrescible, and an examination of the creek below the outlet does not show any evidence of sewage growths or allied forms. The plant is at present handling all the sewage of the institution in a satisfactory manner.

DEPARTMENT OF HEALTH.

Engineering Division.

CONTRACT NO. 9. FINAL ESTIMATE FOR WORK DONE AND MATERIAL DELIVERED ON THE GROUNDS FOR SEWAGE DISPOSAL PLANT AT THE STATE INSTITUTION FOR FEEBLE MINDED OF WESTERN PENNSYLVANIA, POLK, VENANGO COUNTY, PA.

April, 1909, to May 23, 1910.

ACCOUNT OF CONTRACT WITH THOMAS BARRETT, WILMERDING, PA.

Dated January 28, 1909.

Item (1) 4897.5 cubic yards excavation @ $0.46,	$2,253 83	
Item (3) 2685.8 cubic yards embankment @ $0.20,	537 16	
Item (4) 2410.24 square yards top soil and seeding @ $0.05,	120 51	
Item (5) 70.23 cubic yards walks @ $1.67,	117 28	
Item (6) 383.07 cubic yards concrete class "'A" @ $8.75,	3,351 86	
Item (7) 248.12 cubic yards concrete, class "B" @ $8.00,	1,984 96	
Item (8) 389.17 cubic yards concrete, class "C" -- $6.00,	2,335 02	
Item (9) 40.19 pounds steel reinforcement @ 3c,	1,215 57	
Item (10) 726 square feet No. 4 rib metal @ 6c,	43 56	
Item (11) 8176.3 square feet No. 6 rib metal @ 5c,	408 82	
Item (12) 3105.54 cubic yards crushed stone filling @ $1.40,	4,347 76	
Item (13) 966 cubic yards sand for sludge bed @ $2.00,	1,932 00	
Item (14) Syphon for dosing tank,	300 00	
Item (15) 5940 lbs. cast iron gratings @ $0.0325,	193 05	
Item (16) Appurtenances for settling tanks,	460 00	
Item (17) 35 sets manhole frames and covers -- $9.00,	315 00	
Item (18) 244 manhole steps @ 30c,	73 20	
Item (19) 12198.21 lbs. steel "I" beams @ 3c,	365 95	
Item (20) 82 feet. 18" conduit to sprinkling filters @ 60c,	49 20	
Item (21) 163.5 feet 18" half tile in filters @ 25c,	40 89	
Item (22) 1185 feet 6" half tile in filters @ $0.0425,	503 88	
Item (23) Placing 4" distributing pipe,	192 00	
Item (24) 70 3" cast iron risers @ $3.00,	210 00	
Item (25) 95 sprinkling nozzles @ $3.00,	285 00	
Item (26) Pump house,	795 00	
Item (27) Pump and engine,	741 00	
Item (28) Orifice box,	40 00	
Item (29) Chemical feed box,	25 00	
Item (30) 20.65 tons cast iron piping @ $25,	516 25	
Item (31) 9775 pounds cast iron standard specials @ $0.0325,	317 69	
Item (32) 7550 pounds cast iron flanged specials @ 4c,	302 00	
Item (33) 360 ft. 15" t. c. pipe @ 30c,	108 00	
Item (34) 1119 ft. 12" t. c. pipe @ 22c,	246 18	
Item (35) 305 ft. 10" t. c. pipe @ 20c,	61 00	
Item (36) 385 ft. 8" t. c. pipe @ 15c,	57 75	
Item (37) 1810 ft. 6" t. c. pipe @ 9c,	162 90	
Item (38) 3018 ft. 2" g. i. water pipe @ 30c,	905 40	
Item (39) 1 8" gate valve,	22 00	
Item (40) 6 6" gate valves @ $15.00,	90 00	
Item (41) 14 4" gate valves @ $9.50,	133 00	
Item (42) 14 ⅝" brass stop cocks @ $1.00,	14 00	
Item (43) 1 12" sluice gate valve,	35 00	
Item (44) 1 10" sluice gate valve,	32 00	
Item (45) 8 8" sluice gate valves @ $28.00,	224 00	
Item (46) 8 6" sluice gate valves @ $23.80,	184 00	
Item (47) 6 12" shear gates @ $21.00,	126 00	
Item (48) 1 6" shear gates @ $17.00,	17 00	
Item (49) 1955.5 feet 12" t. c. sewer pipe @ 65c,	1,271 08	
		$28,061 75

Extra Material At Cost Plus 15% Profit As Specified.

Cost of changing piping to pump in pump house @ cost, plus 15%,	$5 00	
2 wooden cypress doors for gasoline tank @ cost, plus 15%,	5 00	
2 pair hinges for doors @ cost, plus 15%,	1 00	
1 door for exhaust chamber, cost, plus 15%,	1 00	
Extra work on 6" open drains around settling tanks based on 247 hours labor @ 20c, $49.40, plus 15%,	56 81	
Turning 12" cast iron sludge line, 40 hours labor @ 16c, plus 15%,	7 36	
Arch under syphon, lump sum, plus 15%,	10 00	
Reinforcement around steel "I" beams, 100 lb. wire at cost, plus 15%,	2 65	
Labor placing steel "I" beams @ cost, plus 15%,	4 00	
1 ½" g. i. pipe, 40 lineal feet @ cost, plus 15%,	12 00	
Changing door of pump house, cost, plus 15%,	2 00	
2 additional courses of brick on pump house—392 @ $18.50 and mason 2 hours @ 65c, at cost, plus 15%,	9 83	
Changing screens in inlet chamber at cost, plus 15%,	5 00	
1 2" valve @ cost, plus 15%,	3 00	
1 cast iron valve box @ cost, plus 15%,	3 50	
		128 15
Total cost of plant,		$28,189 90

Partial Payments—Monthly Estimate:

No. 1, to May 1, 1909,	$2,774 62	
No. 2, to June 1, 1909,	2,820 66	
No. 3, to July 1, 1909,	4,583 38	
No. 4, to Aug. 1, 1909,	1,484 74	
No. 5, to Sept. 1, 1909,	1,851 58	
No. 6, to Oct. 1, 1909,	2,497 50	
No. 7, to Nov. 1, 1909,	3,112 20	
No. 8, to Dec. 1, 1909,	1,392 80	
Total partial payments,		20,517 48
Total less partial payments,		$7,672 42
Deduct cost of engineering from July 29, 1909, to May 1, 1910, inc.,		1,350 32
Final payment,		$6,322 10

May 23, 1910.

THOMAS FLEMING JR.,
Assistant Engineer in charge of work.
Approved: F. HERBERT SNOW,
Chief Engineer.

Sanitary Sewer System.

As stated in the Annual Report of 1909, an appropriation was made by the General Assembly for a sanitary sewerage system to operate in conjunction with the sewage disposal plant. The work in detail has also been described in the annual report for that year, showing that the first set of proposals was rejected by advice of the Commissioner of Health and that a second set of bids was received and opened on June 28, 1909. As these proposals appeared excellent the trustees were advised to accept the same and awarded the contract to Mr. Thos. Barrett, the lowest bidder, who was bonded in the sum of 50% of the aggregate amount of the contract price by the Title Guaranty and Surety Company of Scranton. Formal notice was given the contractor on July 14th to begin construction and work should have been started on July 26th and completed seventy working days thereafter or on October 16, 1909. Two days of rain in that time extended the period of October 19th. On this date, however, less than one-half of the work had been completed. It was found impossible to proceed with the work during the winter and as provided in the contract a notice was sent to the contractor on February 18, 1910, to close down until further notice. The work was re-opened April 18th, inspected and found complete on May 23rd. By contract admitted and liquidated damages were fixed at $15 a day. On October 16, 1909, a formal notice was sent to the contractor and to the bonding company notifying them that the contract term had expired and that the liquidated damages would be deducted according to the contract. The total time elapsing after the expiration of the contract period until the final inspection, not including the time during which the work was closed down, was 158 days, which at $15 a day, would amount to $2,370 liquidated damages. Frequent other notices were sent before the end of the year 1909.

The cause of the unnecessary delay has been mainly due to the incompetency of the contractor in handling work of this character and his failure to obtain sufficient labor to advance the work repidly. It is roughly estimated that the loss to the contractor on this work and the sewage disposal plant amounted to $8,000.00. In view of this fact and of the fact that the institution obtained a first-class piece of work, due to constant supervision of construction, it was requested by the trustees that only as much of the liquidated damages be collected from the contractor as would pay the actual cost of engineering necessitated by the delay, which amounted to $683.07 and covered the cost of inspections and the traveling expenses of the Engineer of Designs and Construction between Harrisburg and Polk.

The contract provided that all of the work not covered by the unit prices proposed should be paid for on a cost plus 15% basis. It was necessary to do considerable excavating to learn whether the proposed sewers would conflict with those already in existence and as no plan and profiles of the old sewer were obtainable. The complicated arrangement of old drains made it difficult to foresee a large amount of work on the new contract, to which may be ascribed the difference between the engineer's estimate and the actual cost of the work. The extra work consisting of hangers for soil pipes in the basements, brick piers where it was impossible to use hangers, changes in alignment and grade of the new sewers caused by the presence of the old pipes, extra connections, catch basins and grease traps. The total amount of the extra work was $699.09. At the request of the trustees the outfall sewer was changed as well as some of the laterals. The storm water drainage system near the village was constructed as originally planned with the exception of the addition of a catch basin for the purpose of intercepting surface flow.

In carrying out the work exceptionally good weather conditions prevailed during the contract. The excavation was not difficult, practically no rock being encountered and no ground water seriously interfering with the construction, no underdrain was needed. During the fall and winter after the contract period had expired the contractor found it necessary to shore up the trench and provide for a pump. A large amount of sewer pipe was rejected on the ground and manholes were unsatisfactory and requiring repairs to make them watertight. Several sections of sewers were condemned and replaced. The contractor did not give sufficient personal attention to insure proper handling of the work and the burden of construction fell upon the Department's inspectors who not only had to lay out the work but supervise it and were compelled to instruct the contractor's men in the proper method of working. During the cold weather little outdoor work was done, the contractor spending most of his time placing interior connections.

There were six monthly estimates, the final one being for June, 1910, which is given herewith, together with a list and prices of the extra material and work.

The sewers were placed in operation as fast as house connections were made and were drained temporarily into the creek near the ice pond. During the early spring it was necessary to eliminate this drainage and the sewers were therefore carried to the sewage disposal plant and by-passed to the creek. The sewage disposal plant was placed in operation on July 5th and has been operating continuously since that date. Grease traps were installed at several points where it was found necessary to do so to prevent clogging of the sewer and assist in the operation of the sewage disposal works.

Upon final payment of the contractor, it was found that an unexpended balance of $1,487.14 remained of the appropriation for disposal plant and sewerage system. Therefore small extensions were made around the institution in connection with the sewerage system of outlying buildings and it was suggested to the trustees that part of the remaining money be expended for laboratory supplies for making tests of the disposal plant operation.

Final plans and profiles of the sewerage system showing precise location of all sewers as connected, and approximately as constructed, have been prepared and placed on record and also plans and specifications for grease lines for three buildings. It appears that the only excuse the contractor can make for delay in completing the contract is lack of experience in handling men and lack of sufficient labor, but the trustees felt that the liquidated damages due to his carelessness and neglect might be ignored except as far as covered by actual engineering expenses. It was suggested that particular attention be given to the care and operation of the sewers and sewage disposal plant and that the institution should attend to eliminating all sources of pollution of the streams on their property. These suggestions have been, for the most part, carried out by the trustees of the institution.

63

DEPARTMENT OF HEALTH.

Engineering Division.

CONTRACT NO. 10. FINAL ESTIMATE FOR WORK DONE AND MATERIAL DELIVERED ON THE GROUNDS FOR THE COMPLETION OF A SANITARY SEWERAGE SYSTEM FOR THE STATE INSTITUTION FOR FEEBLE MINDED OF WESTERN PENNSYLVANIA, POLK, VENANGO COUNTY, PA.

July, 1909, to June, 1910.

ACCOUNT CONTRACT WITH THOMAS BARRETT, WILMERDING, PA.

62—17—1910. Dated June 28, 1909.

Item (1)	1222.2 feet 6″ t. c. pipe, 4′ to 6′ deep @ 37c per lineal foot,	$452 21	
Item (2)	989 feet 6″ t. c. pipe 6′ to 8′ deep @ 49c per lineal foot,	484 61	
Item (3)	112 feet 6″ t. c. pipe 8′ and over deep @ 67c per lineal foot,	75 04	
Item (4)	290 feet 8″ t. c. pipe 3′ to 4′ deep @ 40c per lineal foot,	116 00	
Item (5)	1059.2 feet 8″ t. c. pipe 4′ to 6′ deep @ 44c per lineal foot,	466 05	
Item (6)	1167 feet 8″ t. c. pipe 6′ to 8′ deep @ 56c per lineal foot,	653 52	
Item (7)	1490 feet 8″ t. c. pipe, 8′ to 10′ deep @ 74c per lineal foot,	1,102 60	
Item (8)	692 feet 8″ t. c. pipe, 10′ to 12′ deep @ 89c per lineal foot,	615 88	
Item (9)	532.67 feet 8″ t. c. pipe 12′ and over deep @ $1.07 per lineal foot,	569 96	
Item (10)	150 feet 12″ t. c. pipe, 3′ to 4′ deep @ 54c per lineal foot,	81 00	
Item (11)	1258.33 feet 12″ t. c. pipe, 4′ to 6′ deep @ 57c per lineal foot,	717 25	
Item (12)	590 feet 12″ t. c. pipe, 6′ to 8′ deep @ 69c per lineal foot,	407 10	
Item (13)	150 feet 12″ t. c. pipe 8′ to 10′ deep @ 85c per lineal foot,	127 50	
Item (14)	333 ft. 12″ t. c. pipe, 10′ and over deep @ $1.20 per lineal foot,	399 60	
Item (15)	241 ft. 15″ t. c. pipe, 4′ to 6′ deep @ 68c per lineal foot,	163 88	
Item (16)	296 feet 30″ t. c. pipe, 4′ to 8′ deep @ $1.06 per lineal foot,	313 76	
Item (17)	300.5 vertical feet of brick manholes @ $3.75 per vertical foot,	1,126 88	
Item (18)	34 manhole frames and covers @ $8.40 per set,	285 60	
Item (19)	180 manhole rungs @ 30c each,	54 00	
Item (20)	6 brick grease traps @ $20.00 each,	120 00	
Item (21)	4 brick catch basins @ $60.00 each,	240 00	
Item (22)	14 8x6 t. c. ys. @ $2.60 each,	36 40	
Item (23)	16 15x6 t. c. ys. @ $4.00 each,	64 00	
Item (24)	22 12x6 t. c. ys. @ $3.40 each,	74 80	
Item (25)	15 cast iron flap gates @ $18.00 each,	270 00	
Item (26)	7.94 cubic yards rock excavation @ 50c per cubic yard,	3 97	
Item (27)	979.25 feet 1″ g. i. water pipe @ 27c per lineal foot,	264 40	
Item (28)	10 water connections @ $6.00 each,	60 00	
Item (29)	8 cubic yards extra concrete @ $7.00 per cubic yard,	56 00	
Item (30)	1875 feet 5″ cast iron drain pipe @ 36c per lineal foot,	675 00	
Item (31)	50 house connections @ $7.00 each,	350 00	
Item (32)	45 running traps @ $3.60 each,	162 00	
Item (33)	14,616 lbs. cast iron pipe @ 3c per lb.,	438 48	
			$11,027 49

Extra Material at Cost Plus 15% Profit as Specified.

20 hangers for 5″ soil pipe in basements @ 35c each,	10 50	
Brick piers in basements of buildings for supporting 5″ cast iron pipe,	149 35	
Cost of changing trenches on account of old sewers,	82 90	
Removing stone from below invert of sewer in trench,	2 36	
Making connection to 5″ cast iron pipe at laundry,	3 00	
Making connection to 8″ t. c. pipe in tunnel at laundry,	7 73	
Changing catch basin,	6 65	
Small catch basin for 8″ t. c. pipe on drainage system,	11 11	
5 foot grease trap at general kitchen, complete,	85 24	
Trench work for cast iron house lines,	73 80	
1 12″x12″ t. c. wye,	1 35	
1 10″x6″ t. c. wye,	1 02	
Extra weight for cast iron manhole frames and covers as provided in contract for alternate brick manholes, 2142 lbs. @ 3.7c,	79 25	
119.8 feet 2″ cast iron std. soil pipe with specials @ 12c,	14 38	
119.8 feet 3″ cast iron std. soil pipe with specials @ 17c,	26 28	
252.3 feet 4″ cast iron std. soil pipe with specials @ 21c,	52 98	
	$607 90	
	15%	699 09
Total cost of sewers,		$11,726 58

Partial Payments—Monthly Estimate:		
No. 1, Sept. 8, 1909,	$1,130 24	
No. 2, Oct. 1, 1909,	2,020 46	
No. 3, Nov. 1, 1909,	1,114 47	
No. 4, Dec. 2, 1909,	2,212 00	
No. 5, Jan. 7, 1910,	315 33	
Total partial payments,		6 792 50
Total less partial payments,		$4 934 08
Deduct cost of engineering from Oct. 19, 1909, to May 23, 1910, inclusive, with allowance for closing down during winter,		683 07
Final payment,		$4,251 01

July 18, 1910.

THOMAS FLEMING, JR.,
Assistant Engineer in charge of work.
Approved: F. HERBERT SNOW,
Chief Engineer.

The total amount of the final estimate for this work is $11,726.58. The engineer's estimate, based on the contractor's bid and the unit prices, is $12,906.00 so that there is a saving of $1,179.42. This saving has been due to the fact that no underdrains were used, no rock encountered and to the fact that it was not necessary to construct the full amount of sewers provided in the approximate estimate.

E. Hamburg State Sanatorium

In the spring of 1910 the Commissioner of Health and the Chief Engineer visited several localities with the intention of determining the most suitable place for the construction of a State Sanatorium for Tuberculosis. The Commissioner decided, after thorough investigation, that the borough of Hamburg was the most favorable location and instructed the Chief Engineer to investigate three sites in or near the place and to report to him upon the suitability of each sanatorium purposes from an engineering standpoint.

After this had been done, it was decided that the property known as the Stein farm presented the most favorable conditions and during the summer surveys were made of this tract to define its boundaries and to determine the best manner in which to develop its resources for institutional purposes, with particular reference to water supply and drainage.

At the end of the year, after the property had been purchased by the State, a preliminary estimate of the cost of water works and a sewerage system was prepared as a basis upon which to ask for an appropriation for these purposes.

Hamburg lies in the northern part of Berks County, about 18 miles north of the city of Reading and in Windsor Township, along the east bank of the Schuylkill River and is served by the Pennsylvania Railroad, Schuylkill Division, and the Philadelphia & Reading Railway, Reading Division. The borough has a population of about 2,500 and is the center of a very productive agricultural community, which has no public sewers and gets its water supply from the Windsor Water Company.

The main tract of the Stein farm, about 262 acres, is located about one mile east of the borough of Hamburg, in Windsor Township, north of and along the State Road. The land slopes upward from this road to a ridge about 800 feet distant, lying 60 feet higher than the road itself. North of the ridge the ground slopes precipitously to a stream about 400 feet distant and 130 feet lower in elevation. This stream flows westerly through the State lands and its general course parallels the State road. North of it the land rises again more gradually and on this slope are cultivated fields and farm buildings belonging to the property.

Near the eastern end of the main tract a public road crosses it, passing northerly from the State road, crossing the creek to an intercepting highway a mile distant. Along this road are located the buildings of the Stein farm, the house, barns and other buildings still being occupied by the Stein family, who care for the property until the State takes actual possession of it. A spring on this land is used by the tenants, but in summer the flow of this spring is said to almost cease.

The small tract is about 60 acres in area and is composed entirely of woodland which it was necessary to purchase in order to acquire title to the larger tract. The two parcels of land are separated by about 1,500 feet, but a road joins the northern end of the larger to the southern corner of the smaller tract so that it is readily accessible. Besides being valuable for its timber, it also contains quantities of stone which will be available for construction purposes.

Water Supply.

The main stream, Mill Creek, is said to maintain an abundant flow at all times, being fed by numerous springs at various points in the drainage basin, which is composed chiefly of rolling farm lands. Although these springs are not all on State property, a rigid surveillance can be maintained to avoid possibility of pollution of the water. The stream is clear, and, although subject to turbidity after heavy rains, from which it is said to recover in a short time, will prove a copious source of supply for the State institution. Measurements of the flow of this stream show that it is many times larger than would ever be required for the use of the State Sanatorium. And, moreover, it is said that the dry weather practically has no effect on the volume of this supply.

The geologic structure of the ground shows evidence, in the presence of quantities of Trenton limestone which is generally indicative of a copious water supply, of abundant, though hard water, should it be necessary to resort to a deep well supply. No critical examination of the territory has been made with this idea in view, because a softer water at no greater cost, is readily available from the creek.

It is proposed to use this stream as the principal source of supply and to filter the water and raise it to a storage tank on an eminence 1,800 feet east of the building site, where, by means of an elevated steel tower, an ample pressure for all purposes will be available. It is proposed to construct an intake dam, filter and pump house on the bank of the creek, not far from the present farm buildings, at the foot of the ridge slope near the boundary line between the State land and that of Benneville K. Knoll, but no definite plans have been prepared up to this time.

A preliminary estimate of the cost of this plant is as follows:

Concrete intake dam and pump well,	$ 500 00
Filter and pump house,	2,000 00
Two filter units of re-inforced concrete,	2,500 00
Centrifugal pumps and engines to deliver water to filter,	1,200 00
Piping in station and coagulant basins,	850 00
Duplicate high service pump and engines of 150,000 gallons capacity, each,	3,200 00
Force main to tank 6 in., 900 ft. long,	1,350 00
Elevated steel tank, water line 75 feet above ground, 85,000 gallons capacity,	5,000 00
	$ 16,600 00
10% contingencies,	1,660 00
	$ 18,260 00

The distribution system from the tank would cost approximately as follows:

3,100 feet 6 in. cast iron pipe,	$ 4,656 00
1,400 feet 4 in. cast iron pipe,	1,400 00
6 in. meter in case of purchasing an auxiliary supply as later mentioned,	400 00
8 fire hydrants,	320 00
1,000 feet of lateral connections,	1,000 00
	$ 7,776 00
10% contingencies,	777 60
	$ 8,553 60

It would, if necessary, be possible to purchase water from the Windsor Water Company, which supplies the borough of Hamburg, at a rate of 4 cents per thousand gallons. While this might be considered favorably from an economical standpoint, it is not thought advisable to depend upon this supply entirely. While Hamburg is said, never to be without water, it is not certain that an additional tax of 50,000 gallons or more per day on the water company's supply would be sustained during dry weather. If this supply were used, the cost of the distributing system only would have to be considered, which, at about $8,500.00 would result in a saving of $18,260 over the State's supply as outlined in the preceding paragraphs.

The Windsor Water Company derives its water from Furnace Run, about 3½ miles northeast of the borough of Hamburg, in Windsor Township, and if it is decided to take a part or the entire supply for the Sanatorium from this source, a thorough investigation of the watershed of Furnace Run would have to be made.

Sewers and Sewage Disposal.

Along the foot of the ridge sloping toward Mill Creek and 500 feet down stream from the site of the nearest institution buildings, and about 500 feet above the western boundary of the State's land, it is proposed to locate the sewage disposal plant. The farm buildings, however, can be served by gravity from this point. This plant will consist of a screen chamber, two Imhoff tanks, sprinkling filters, re-settling basins and chemical disinfecting plant with an outfall sewer for the effluent. No detail plans have been prepared up to this time, but it is estimated that the plant will cost about $15,000, with due allowance for contingencies in addition.

The stream below the plant passes in a southerly course through Hamburg borough to the Schuylkill River, about one mile distant from the State property.

Since the exact location of the institution buildings is not yet determined, it is impossible to make an exact estimate of the probable cost of the sewers necessary to drain the buildings to the disposal plant, but an approximate cost is estimated to be about $5,000.00

16. WATER AND SEWAGE PURIFICATION.

During the year a section of the Engineering Division under the charge of Assistant Engineer Ralph E. Irwin, has conducted the work of investigating the operation of the various water and sewage purification plants in the State. This section has also had charge of the water sampling in connection with the work of the engineering division. Messrs. R. B. Styer, W. W. Ritter and M. H. Matthes performed the work of assistants. Mr. Ritter acted as clerk. Messrs. Styer and Matthes spent the greater part of their time in field investigations.

Under the direction of the Chief Engineer, the following special investigations were carried on.

Acid and iron waste disposal: Cambria Steel Company, Johnstown and the American Sheet and Tin Plate Company, Vandegrift.

Tannery waste disposal: J. W. and A. P. Howard Tanning Co., Limited, Corry, Erie County.

Tannery waste disposal: Manns Choice, Bedford County.

Installation of new water works at Saegerstown, Crawford County.

Installation of germicidal plant at Riverton Consolidated Water Company's pumping station, Lemoyne.

Use of alum at York filtration plant.

Sewage disposal works Tressler Institute, Loysville, Perry County.

Muncy public water works, Muncy, Lycoming County.

Schuylkill River pollution from Reading to Philadelphia.

Much time was consumed in the investigation and suppression of typhoid fever outbreaks.

Mr. John Bomgardner and Mr. Fred Fletcher resigned on June 7th and 11th, respectively.

Water Purification Plants.

During 1910 there were 80 water purification plants in operation and five under construction. Twelve of the 80 plants were placed in operation during the year. One plant was enlarged to double its former capacity. The 12 new plants and 33 of the plants previously operated were inspected. In each case data was secured concerning the new plants to show whether or not the plans and stipulations of the permit for their construction had been followed. The inspection of plants that were in operation before 1910 was made to ascertain the method of operation and efficiency. Bacteriological water samples were usually collected when inspections were made. Upon the results of the inspections and analyses action was taken to improve the operation and efficiency of the plants.

The following table is a list of the water purification plants placed in operation during 1910:

1. Beaver Creek Water Co., Rutherford Heights.
2. Ellwood City, Ellwood Water Co.
3. Eagles Mere, Eagles Mere Water Co.
4. Jenkintown, Moreland Spring Water Co.
5. Middletown, Middletown & Swatara Cons. Water Co.
6. Natrona, Natrona Water Co.
7. Punxsutawney, Punxsutawney Water Co.
8. Philadelphia, Municipal Water Works, Queen Lane Plant.
9. Reading Municipal Water Works, Bernhart Plant.
10. Scranton, Scranton Gas & Water Co.
11. Springfield Cons. Water Co., Neshaminy Falls Plant.
12. Wilkinsburg, Pennsylvania Water Co.

The Huntingdon Water Supply Co. of Huntingdon doubled its number of filters and filtering capacity during the year 1910.

The water purification plants under construction during the year were as follows:

1. Charleroi, Charleroi Water Co.
2. Morganza, Pennsylvania Reform School.
3. New Cumberland, Riverton Cons. Water Co.
4. Reading Municipal Water Works, Maiden Creek Supply.
5. West Pittsburg, West Pittsburg Water Co.

The 45 water purification plants examined throughout the year are shown in the following list:

1. Beaver Creek Water Co., Rutherford Heights.
2. Beaver Valley Water Co., Eastvale plant.
3. Beaver Valley Water Co., New Brighton plant.
4. Bristol, Bristol Water Company.
5. Butler, Butler Water Company.
6. Cambridge Springs, Municipal Water Works.
7. Chester, New Chester Water Co.
8. Columbia, Columbia Water Co.
9. Connellsville, Connellsville Water Works Co.
10. Enola, Dauphin Consolidated Water Co.
11. Eagles Mere, Eagles Mere Water Co.
12. Ernest, Jefferson & Clearfield Coal & Iron Co.
13. Ellwood City, Ellwood Water Co.
14. Freeport, Freeport Water Works Co.
15. Gettysburg, Gettysburg Water Co.
16. Hummelstown, Hummelstown Cons. Water Co.
17. Huntingdon, Huntingdon Water Supply Co.
18. Harrisburg Municipal Water Works.
19. Lancaster Municipal Water Works.
20. Media Municipal Water Works.
21. Mechanicsburg, Mechanicsburg Gas & Water Co.
22. Middletown, Middletown & Swatara Cons. Water Co.
23. McKeesport Municipal Water Works.
24. New Bethlehem, Citizens Water Co.
25. New Castle, New Castle Water Co.
26. Natrona, Natrona Water Co.
17. Punxsutawney, Punxsutawney Water Co.
28. Philadelphia Municipal Water Works, Queen Lane Plant.
29. Reading Municipal Water Works, Bernhart Plant.
30. Scranton, Scranton Gas & Water Co.
31. Springfield Cons. Water Co., Neshaminy Falls Plant.
32. Springfield Cons. Water Co., Pickering Creek Plant.
33. Sharon, Sharon Water Works Co.
34. South Bethlehem, Bethlehem City Water Co.
35. Spring Grove, P. H. Gladfelter Co.
36. Steelton Municipal Water Works.
37. St. Benedict, St. Benedict Water Co.

38. Sunbury, Sunbury Water Co.
39. Vandegrift, Vandegrift Water Co.
40. Wilkinsburg, Pennsylvania Water Co.
41. Warren, Warren Water Company.
42. West Reading, West Reading Water Co.
    Wilkes-Barre, Spring Brook Water Supply Co.
43. Huntsville Plant.
44. Pine Run Plant.
45. York, York Water Company.

Eleven of the 45 plants inspected made improvements during the year according to suggestions based upon the results of the inspection. These improvements as a whole were small in cost, dealing principally with the equipment of the plant that more efficient operation could be maintained. During the year several plants equipped themselves for simple chemical and bacteriological work or arranged with some nearby laboratory that analyses should be made at stated intervals. In the following table is shown the present state of the 80 filtration plants as to the making of chemical and bacteriological determinations.

Frequency of Chemical and Bacteriological Analyses.

Frequency.	Number of Filtration Plants.	
	Chemical.	Bacterial.
None,	21	16
Occasional,	36	27
Frequent,	5	1
Yearly,	0	1
Monthly,	1	2
Weekly,	8	8
Semi-weekly,	2	1
Daily,	7	24

Sixty-four of Pennsylvania's water purification plants are of the rapid sand type. Fifty-three of these plants obtain their supply from surface waters. These surface waters are not constant but are subject to rapidly changing conditions. When a stream is composed principally of ground water and is clear, nearly colorless, alkaline and low in bacteria the filter plant should not treat the water the same as following precipitation causing surface wash when the stream is highly turbid, colored with vegetable matter, neutral or acid and of high bacterial content. It should be remembered the filters are not mechanical but rapid sand filters working at a high rate under rapidly changing conditions with but few devices for automatic control. All filters depend upon sand as the filtering medium and the efficiency of the plant depends upon the condition of the sand bed. The purity or impurity of the filtrate depends wholly upon how successfully the man in charge handles the changing conditions to which the sand bed is subjected. Few realize that the position of the filter operator is one of importance. The eighty men operating the water purification plants of this State have the health and lives of over three million of our people more within their keeping than any other body of men within the Commonwealth. Our many hundreds of highly educated, experienced and licensed medical men are trusted with no greater responsibilities than these eighty unlicensed, and in most instances uninstructed, filter plant operators.

The stipulation in the permits issued for the construction of water purification plants requiring that the plants be operated under the responsible supervision of the expert who designed them for several months or a year after the beginning of operation, or if not by the designing expert by some other equally competent person, is having a good effect upon the early period of operation. Those who are to have the constant care of the filters become better fitted for the position of operators and often the operators are prevented from obtaining many of the false theories and ideas so prevalent among uninstructed men.

The supervision of water purification plants by traveling experts is becoming more common. In this way the plants are given more immediate attention than could be secured in any other way at the present time. Many water works suprintendents and directors desire more efficient operation. Sometimes improvement is made by employing a supervising operator who may frequently visit the plant, or by securing the services of some expert in charge of a nearby laboratory where results of frequent analyses may be obtained and used to improve the operation. More competent men are being employed at the large filtration plants than heretofore.

The accompanying chart shows the location and name of each of the water purification plants together with the name of the districts in which water is furnished, population of the districts, number of consumers, million gallons consumed per day, source of supply, date when the water works were built and the filter plants installed, the kind of filters used, number of units in each filter, number million gallons capacity, sedimentation period, the frequency with which analyses are made and data concerning equipment of the plant and chemicals used in treating the water.

COMMONWEALTH OF PENNSYLVANIA, DEPARTMENT OF HEALTH, ENGINEERING DIVISION. PURIFICATION PLANTS FOR PUBLIC WATER SUPPLIES.

No.	Location and Name.	Water Furnished.	Population of district.	No. of consumers.	Mil. gals. consumed per day.	Source of Supply.	Water works built.	Filter Installed.
1	Apollo, Apollo Water Works Co.,	Apollo, Leechburg, West Apollo, Poulton, Oklahoma.	6,600	5,500	0.140	Beaver Run,	1888	1903
2	Beaver Creek Water Co., Rutherford Heights,	Shop and engines of P. & R. R., **Rutherford Heights.**	None	None	0.700	Beaver Creek.	1901	1910
3	Beaver Valley Water Co., East Vale Plant,	Beaver Valley towns,	24,400	20,000	4,000	Beaver River,	1901	6-1892:4-1900
4	Beaver Valley Water Co., New Brighton Plant,	Beaver Valley towns,	24,400	20,000	4,000	Beaver River,	1879	5-1904:2-1907
5	Bristol, Bristol Water Co.,	Bristol boro,	9,000	6,000	1,000	Delaware River,	1875	1906
6	Butlsr, Butler Water Co.,	Butler boro,	20,000	15,000	2,100	Connoquenessing Creek, Thorn Run,	1878	4-1902:4-1906 2-1903
7	Cambridge Springs Municipal Water Works,	Cambridge Springs,	2,000 to 5,000	3,000	0.1 to 0.4	French Creek,	1898	1908
8	Canton Citizens Water Co.,	Canton boro and vicinity,	2,500	2,000	0.400	Mill Cr., Nephawin Lake	1878	1899
9	Carlisle, Carlisle Gas and Water Co.,	Carlisle boro,	10,000	10,000	1.000	Connodoguinet Creek,	1854	1896
10	Chester, New Chester Water Co.,	Chester and suburbs,	43,000	39,000	5.0	Delaware River,	1868	12-1906 6-1908
11	Clarion, Clarion Water Co.,	Clarion boro,	2,600	2,600	0.36	McLain Run, drilled wells,	1875	1902
12	Columbia, Columbia Water Co.,	Columbia boro,	11,500	11,000	1.0	Susquehanna River,	1826	1902
13	Connellsville, Connellsville Water Works Co.,	Connellsville and suburbs,	14,600	13,400	1.0	Youghiogheny River,	1898	1909
14	Danville Municipal Water Works,	Danville boro,	7,500	7,000	1.5	No. Branch Susquehanna River.	1873	1906
15	Danville State Hospital Water Works,	State Hosp. for Insane,	1,700	1,700	0.35	No. Branch Susquehanna River.	1900	1-1903:2-1909 1-1905
16	Eagles Mere, Eagles Mere Water Co.,	**Eagles Mere** boro.,	800	800	0.10	Eagles Mere Lake,	1902	1910
17	Elizabeth, Monongahela Valley Water Co.,	Monongahela Valley towns	17,500	14,000	1.40	Monongahela River,	1895	1901

PURIFICATION PLANT FOR PUBLIC WATER SUPPLIES.—Continued.

No.	Location and Name.	Water Furnished.	Population of district.	No. of consumers.	Mil. gals. consumed per day.	Source of Supply.	Water works built.	Filter Installed.
18	Ellwood City, Ellwood Water Co.,	Ellwood city and suburbs,	4,500	3,800	2.6	Slippery Rock,	1892	1910
19	Enola, Dauphin Cons. Water Co.,	Enola boro,	1,000	950	0.1	Susquehanna River and wells.	1905	1908
20	Ernest, Jefferson and Clearfield Coal and Iron Co.	Ernest boro,	1,800	1,800	0.8	McKees Run,	1907	1907
21	Franklin Municipal Water Works,	Franklin and suburbs,	11,000	8,000	0.8	French Creek and wells,	1865	1908
22	Freeport, Freeport Water Works Co.,	Freeport and suburbs,	2,500	2,400	0.5	Allegheny River,	1884	1909
23	Gettysburg, Gettysburg Water Co.,	Gettysburg boro,	4,000	3,900	0.4	Marsh Creek and wells,	1847	1894
24	Harrisburg, Municipal Water Works,	Harrisburg, and suburbs,	70,000	70,000	11.0	Susquehanna River,	1843	1905
25	Holmesburg, Phila. and Bristol Water Co.,	N. Phila., suburban wards.	20,000	20,000	2.0	Sandy Run and Pennypacker Creek.	1888	1-1888:2-1907 3-1893
26	Hummelstown, Hummelstown Cons. Water Co.,	Hummelstown, part Swatara twp.	20,000	8,000	1.5	Swatara Creek,	1887	1909
27	Huntingdon, Huntingdon Water Supply Co.,	Huntingdon and suburbs,	7,500	6,500	1.0	Standing Stone Creek,	1885	6-1900 6-1910
28	Indiana, Clymer Water Co.,	Indiana boro,	5,700	5,000	0.5	Two Lick Creek,	1898	1908
29	Iselin, Pitts. Gas Coal Co.,	Iselin boro,	1,500	1,500	0.04	Hoopers Run, Blacklegs Creek.	1904	1906
30	Jenkintown, Moreland Springs Water Co.,	Jenkintown and vicinity,	5,000	2,000	0.45	Pennypack Co. and artesian wells.	1909	1910
31	Kittanning, Armstrong Water Co.,	Kittanning and Wick boro	9,000	7,500	1.2	Allegheny River,	1871	1905
32	Lancaster Municipal Water Works,	Lancaster city,	50,000	48,000	7.0	Conestoga Creek,	1888	1906
33	McKeesport Municipal Water Works,	McKeesport city,	42,500	42,000	4.0	Youghiogheny River,	1883	1908
34	Mechanicsburg, Mechanicsburg Gas and Water Co.	Mechanicsburg and suburbs,	5,000	4,500	0.5	Yellow Breeches Creek and springs.	1858	1909
35	Media Municipal Water Works,	Media, Moylan and Wallingford.	6,000	5,500	0.55	Ridley Creek,	1854	1898-1901

36	Middletown, Middletown and Swatara Cons. Water Co.	Middletown and suburbs,	6,000	5,000	0.55	Swatara Creek and Iron Mine Run.	1885	1910
37	Monessen, Monessen Water Co.,	Monessen and suburbs,	13,000	12,000	1.75	Monongahela River,	1899	1905
38	Monongahela, Monongahela City Water Co.,	Monongahela and vicinity.	8,000	5,800	0.53	Monongahela River,	1887	1904
39	Natrona, Natrona Water Co.,	Harrison twp., Allegheny Co.	6,600	5,000	0.4	Springs and Allegheny River.	1908	1910
40	New Bethlehem, Citizens Water Co.,	New Bethlehem and vicinity	2,100	1,500	0.18	Red Bank Creek,	1883	1-1899:1-1908
41	New Castle, New Castle Water Co.,	New Castle city,	36,600	36,000	3.5	Shenango River,	1882	8-1898:4-1904
42	Newport, Home Water Co.,	Newport and vicinity,	2,200	2,000	0.125	Juniata River,	1893	1909
43	Norristown, Norristown Ins. Water Co.,	Norristown and Bridgeport.	35,000	33,000	2.00	Schuylkill River,	1847	1901
44	Northeast Municipal Water Works,	Northeast boro,	2,600	2,600	0.125	Sixteen Mile Run and Springs.	1886	1908
45	Phila. Municipal Water Works, Upper Roxborough Plant.	Philadelphia city,	70,000	70,000	20.0	Schuylkill River,	1869	1904
46	Phila. Municipal Water Works, Lower Roxborough Plant.	Philadelphia city,	160,000	160,000	36.0	Schuylkill River,	1869	1908
47	Phila. Municipal Water Works, Belmont Plant,	Philadelphia city,	50,000	50,000	12.0	Schuylkill River,	1869	1902
48	Phila. Municipal Water Works, Torresdale Plant,	Philadelphia city,	950,000	950,000	228.0	Delaware River,	1907	1907
49	Phila. Municipal Water Works, Queen Lane Plant,	Philadelphia city,	270,000	270,000	68.0	Schuylkill River,	1895	1910
50	Pittsburg Municipal Water Works,	Part of Greater Pitts.,	533,000	350,000	70.0	Allegheny River,	1826	1906-1909
51	Pottstown, Pottstown Gas and Water Co.,	Pottstown and suburbs,	17,000	16,000	2.2	Schuylkill River,	1869	1909
52	Punxsutawney, Punxsutawney Water Co.,	Punxsutawney, Big Run,	10,000	9,000	0.9	Clover Run, Mahoning Creek.	1887	1910
53	Reading Municipal Water Works, Egelman Plant,	Part of Reading,	8,500	4,000	0.32	Spring Run,	1903	1903
54	Reading Municipal Water Works, Antietam Plant,	Part of Reading,	43,500	23,000	3.1	Antietam Creek,	1880	1905
55	Reading Municipal Water Works, Bernhart Plant,	Part of Reading,	41,000	23,500	3.2	Bernhart Creek,	1821	1910
56	Ridgway Municipal Water Works,	Ridgway boro,	5,500	5,000	1.0	Big Mill Creek,	1888	1908
57	Royersford, Home Water Co.,	Royersford and Spring City.	5,900	5,000	0.4	Schuylkill River,	1889	1893
58	St. Benedict, St Benedict Water Co.,	St. Benedict village,	800	700	0.03	Rock Run,	1903	1904
59	Sayre and Athens, Sayre Water Co.,	Sayre and Athens boros,	10,500	9,500	1.5	N. Branch Susquehanna River.	1884	1904
60	Scranton, Scranton Gas and Water Co.,	Scranton, Providence Dist.	130,000	60,000	6.0	Leggett Creek,	1868	1910
61	Sharon, Sharon Water Works Co.,	Sharon, South Sharon,	25,000	20,000	2.0	Shenango River,	1883	4-1900:4-1903
62	South Pittsburg, South Pittsburg Water Co.,	So. Pitts., suburban	60,000	60,000	6.6	Monongahela River,	1895	1905
63	South Bethlehem, Bethlehem City Water Co.,	South Bethlehem and vicinity.	25,000	23,000	2.8	Lehigh River,	1885	1904
64	Springfield Cons. Water Co., Neshaminy Falls,	Phila suburban towns,	25,000	18,000	1.8	Neshaminy Falls Creek,	1910	1910
65	Springfield Cons. Water Co., Pickering Cr. Sta.,	Phila. suburban towns,	33,000	26,400	1.68	Pickering Creek,	1897	1897
66	Springfield Cons. Water Co., Pickering Cr. Sta.,	Phila. suburban towns,	22,000	17,600	1.12	Pickering Creek,	1897	1897
67	Springfield Cons. Water Co., Springfield Sta.,	Phila. suburban towns,	80,000	50,000	4.2	Crum Creek,	1896	1896
68	Spring Grove P. H. Glatfelter Co.,	Spring Grove boro,	1,500	1,500	0.12	West Branch Codorus Creek.	1884	1895
69	Steelton Municipal Water Works,	Steelton boro,	14,000	14,000	2.5	Susquehanna, River,	1908	1908
70	Sunbury, Sunbury Water Co.,	Sunbury boro,	14,000	13,500	3.0	Little Shamokin Cr., Susquehanna River.	1884	6-1904:2-1907

PURIFICATION PLANT FOR PUBLIC WATER SUPPLIES.—Continued.

No.	Location and Name.	Water Furnished.	Population of district.	No. of consumers.	Mil. gals. consumed per day.	Source of Supply.	Water works built.	Filter installed..
71	Tarentum, Allegheny Valley Water Co.,	Tarentum and suburban towns.	11,500	11,000	2.5	Allegheny River,	1886	1908
72	Vandergrift, Vandergrift Water Co.,	Vandergrift and suburbs,	4,000	3,500	0.5	Artesian wells,	1895	2-1897:1-1905
73	Washington, Citizens Water Co.,	Washington and suburbs,	20,000	14,000	1.2	Trib. of Chartiers Cr.,	1887	1902
74	Warren, Warren Water Co.,	Warren city,	11,000	8,000	1.3	Morrison Run, Allcheny River.	1882	1909
75	Waynesburg, Waynesburg Water Co.,	Waynesburg and vicinity.	5,000	1,000	0.1	Big and Little Ten Mile Rum.	1888	1902
76	West Reading, West Reading Water Co.,	West Reading, Wyomissing.	2,500	2,500	0.15	Schuylkill River,	1886	1896
77	Wilkinsburg, Penna. Water Co.,	Wilkinsburg and vicinty,	75,000	70,000	9.0	Allegheny River,	1888	1910
78	Wilkes-Barre, Spring Brook Water Supply Co.,	Wilkes-Barre and suburbs,	100,000	70,000	8.0	Huntsville Shed,	1857	1895
79	Wilkes-Barre, Spring Brook Water Supply Co.,	Wilkes-Barre and suburbs,	80,000	60,000	6.0	Crystal Lake Shed,	1857	1895
80	York, York Water Co.,	York and suburbs,	60,000	55,000	4.2	S. Branch Codorus Creek,	1816	1899

COMMONWEALTH OF PENNSYLVANIA, DEPARTMENT OF HEALTH, ENGINEERING DIVISION. PURIFICATION PLANT FOR PUBLIC WATER SUPPLIES.

No.	Kind of, Filter.	No. of units.	Total capacity in mil. gals.	Sedimentation period.	% wash water.	Controller.	Rewash.	Loss of head gage.	Alum coagulant.	Other chemicals.	Analyses.		Miscellaneous.
											Chemical.	Bacteriological.	
1	Harlow, slow sand,	2	2.000	30 days	------	+	+	—	—	None,	None,	None,	Sed. in dam.
2	Pitts. Fil. Mfg. Co., rapid sand,	2	1.000	2 hrs.	4.0	—	—	—	+	None,	None,	None.	
3	Jewell, rapid sand,	10	5.000	1 hr.	7.0	+	+	—	+	None,	Occasional,	Occasional,	
4	Pitts. Fil. Mfg. Co., rapid sand,	7	3.500	3 hrs.	7.0	+	+	—	+	None,	Occasional,	Occasional,	
5	Jewell, rapid sand,	4	2 000	2.5 hrs.	3.0	+	+	+	+	None,	Occasional,	Occasional,	
6	American Water and Guarantee Co., rapid sand.	10	5.000	None	5.0	+	—	—	+	None,	Frequent,	Frequent,	Sed. in dam.
7	Pitts. Fil. Mfg. Co., rapid sand,	2	1.000	1 hr.	7.0	+	+	—	+	None,	Occasional,	Occasional,	
8	N. Y. Cont. Jewell, rapid sand,	1	0.25	12 hrs.	------	—	—	—	+	None,	Occasional,	Occasional,	
9	Morison Jewell, rapid sand,	3	1.2	None	5.0	+	+	—	+	None,	Occasional,	Occasional,	Sed. in dam.
10	Roberts and Hodkinson, rapid sand,	18	10.0	80 hrs.	1.3	+	+	—	+	None,	Occasional,	Weekly.	
11	N. Y. Cont. Jewell, rapid sand,	1	0.75	3 hrs.	------	+	+	—	+	None,	Occasional,	Occasional,	
12	Pitts. Fil. Mfg. Co., rapid sand,	4	2.0	4 hrs.	11.0	+	+	+	+	None,	None,	Monthly.	
13	N. Y. Cont. Jewell, pressure converted to gravity.	3	2.75	4 hrs.	5.0	—	+	—	+	Calcium oxide.	Occasional,	Daily,	About 20% supply unfiltered.
14	Morison and Jewell, rapid sand,	3	1.5	20 min.	------	—	+	—	+	None,	Occasional,	Occasional,	
15	Jewell and A. M. Water Soft Co., rapid sand.	4	1.6	45 min.	------	+	+	—	+	None,	Occasional,	Occasional,	
16	Roberts Filter Mfg. Co., rapid sand,	1	0.5	None	------	+	+	—	—	None,	Occasional,	Occasional,	
17	N. Y. Cont. Jewell, pressure as gravity,	3	2.25	12 hrs.	4.0	—	+	—	+	Calcium oxide.	Occasional,	Bi-weekly.	
18	Chapin, rapid sand,	4	4.0	4 hrs.	4.0	—	+	—	+	None,	Occasional,	Occasional.	
19	Roberts, rapid sand,	1	0.04	2 hrs.	5.5	—	—	—	+	None,	None,	None,	Well water not filtered.
20	Pitts. Fil. Mfg. Co., rapid sand,	1	0.5	4 hrs.	7.1	+	+	—	+	None,	None,	None.	
21	Greer, rapid sand,	4	2.0	2 hrs.	2.0	+	+	—	+	Calcium oxide.	Occasional,	Occasional.	Well water not filtered.
22	Greer, rapid sand,	2	1.0	8 hrs.	5.5	+	+	+	+	None,	Occasional,	Occasional.	
23	Warren, rapid sand,	1	0.4	5 hrs.	------	—	—	+	+	None,	Occasional,	Occasional,	

PURIFICATION PLANT FOR PUBLIC WATER SUPPLIES.—Continued.

No.	Kind of Filter	No. of units.	Total capacity in mil. gals.	Sedimentation period.	% wash water.	Controller.	Rewash.	Loss of head gage.	Alum coagulant.	Other chemicals.	Analyses.		Miscellaneous.
											Chemical.	Bacteriological.	
24	Pitts. Fil. Mfg. Co., rapid sand, ------	12	12.0	8 hrs.	2.0	+	+	+	+	Calcium oxide.	Weekly, ---	Daily, ----	Part of year chlorinated lime used.
25	N. Y. Cont. Jewell and Roberts, pressure.	6	3.0	24 hrs.	------	—	+	—	+	None, ------	Occasional,	Occasional,	
26	Pitts. Fil. Mfg. Co., rapid sand, ----	4	2.0	8 hrs.	2.0	+	+	—	+	None, ------	Occasional,	Weekly.	
27	A. P. Maignen, semi-slow sand, ----	12	0.8	2 hrs.	------	—	—	—	—	None, ------	None, ------	None.	
28	Roberts Filter Mfg., rapid sand, ------	2	1.0	None	------	—	+	—	+	None, ------	None, ------	None.	
29	Pitts. Fil. Mfg. Co., rapid sand, ------	1	0.06	None	------	+	+	—	+	None, -----	Occasional.	None, -----	Sed. in dam.
30	Roberts Filter Mfg. Co, rapid sand,	3	1.5	3 hrs.	5.0	+	+	+	+	Chlorinated lime,	Occasionally.	Weekly.	
31	A. P. Maignen, semi-slow sand, ------	5	2.0	24 hrs.	------	—	+	—	+	None, ------	None, ------	None, ------	
32	A. P. Maignen, semi-slow, -------------	5	9.0	2.25 hrs.	------	—	+	+	+	Calcium oxide.	Occasionally.	Daily.	
33	Pitts. Fil. Mfg. Co., rapid sand, -----	6	6.0	10 hrs.	0.6	+	+	+	+	Calcium oxide.	Weekly, ---,	Daily, ----	Also use sodium carbonate and chlorinated-lime-W-soft plant.
34	Pitts. Fil. Mfg. Co., rapid sand, ------	6	0.5	6 hrs.	------	+	+	+	+	None, ------	None, ------	None.	
35	Witherill, pressure rapid sand, ------	1	1.0	None	------	—	+	—	+	None, ------	Occasional,	Occasional,	Sed. in dam.
36	C. E Schaup, rapid sand, -------- ----	2	1.0	2 hrs.	1.0	+	+	+	+	None, ------	None, ------	Weekly.	
37	Pitts. Filter Mfg. Co, rapid sand, - -	4	2.0	24 hrs.	------	+	+	—	+	Calcium oxide.	Occasional,	Occasional.	
38	Scaife, rapid sand, ------------------	4	2.0	1.5 hrs.	6.8	—	+	—	+	None, ------	None, ------	Occasional.	
39	W. B. Scaife & Sons, rapid sand, ----	2	0.5	3 hrs.	12.0	+	—	—	+	None, ------	None, ------	None, ------	Spring water not filtered.
40	N. Y. Cont Jewell and Reisert, rapid sand.	2	0.3	10 hrs	2.0	+	+	—	+	Sodium carbonate.	Daily, ----,	None, ------	Raw water Av. 12 P. P. M. acidity.
41	N. Y. Cont Jewell, A. M. W. and G. Co., rapid sand,	12	6.0	6 hrs.	5.5	+	+	—	+	Calcium oxide.	Daily, ------	Daily.	
42	C. E. Schaup, rapid sand, ---- -- -	1	0.25	3 hrs.	8.0	+	+	—	+	None, ------	None, ------	Weekly, ---	In operation only part time.

43	N. Y. Cont. Jewell, rapid sand, ------	8	4.0	2.5 hrs.	3.0	+	+	+	+	None, ------	Occasional,	Occasional,	
44	Hungerford & Terry, pre. rapid sand,	1	0.30	None	6.0	—	+	+	+	None, ------	None, ------	Occasional.	Sed. in dam.
45	Slow sand, ------	8	20.0	8 hrs.	------	+	+	+	—	None, ------	Daily, ------	Daily.	
46	Slow sand, ------	65	40.0	24 hrs.	------	+	+	+	—	None, ------	Daily, ------	Daily.	
47	Slow sand, ------	5	12.0	24 hrs.	------	+	+	+	—	None, ------	Daily, ------	Daily.	
48	Slow sand, ------	18	240.0	None	------	+	+	+	—	None, ------	Daily, ------	Daily.	
49	Slow sand, ------	22	70.0	25 hrs.	------	+	+	+	—	None, ------	Daily, ------	Daily.	
50	Slow sand, ------	46	49.0	20 hrs.	------	+	+	+	+	None, ------	Weekly, ----	Daily.	
51	N. Y. Cont. Jewell, rapid sand, ------	6	4.0	3.5 hrs.	------	+	+	—	+	Chlorinated lime.	Occasional,	Occasional,	
52	Greer, pressure rapid sand, ------	4	2.0	6 hrs.	------	+	+	+	+	None, ------	Occasional,	Occasional,	
53	Slow sand, ------	2	0.5	16 hrs.	------	+	+	+	—	None, ------	Occasional,	Daily.	
54	Slow sand, ------	3	3.5	None	------	+	+	+	—	None, ------	Occasional,	Daily.	
55	Slow sand, ------	6	3.75	3 hrs.	------	+	+	+	—	None, ------	Occasional,	Daily.	
56	Roberts Filter Mfg. Co., rapid sand, --	2	1.0	2 hrs.	------	+	+	—	+	None, ------	None, ------	None.	
57	Morse and Jewell, rapid sand, ------	3	1.25	2.5 hrs.	------	—	+	—	+	None, ------	None, ------	None.	
58	Norwood Engineer Co., pressure rapid sand.	1	0.15	None	------	+	—	—	+	None, ------	None, ------	None.	
59	Robert Witherill Co., rapid sand, ----	8	4.0	None	------	—	—	—	+	None, ------	None, ------	Yearly.	
60	N. Y. Cont. Jewell, rapid sand, ------	6	6.0	40 min.	------	+	+	+	+	None, ------	Weekly, ----	Daily.	
61	Pitts. Fil. Mfg. Co., rapid sand, ------	8	4.0	8 hrs.	------	+	+	—	+	Calcium oxide.	None, ------	Monthly	
62	A. M. W. and G. Co., rapid sand, ----	14	14.0	17 hrs.	2	+	+	+	+	Calcium oxide-iron sulphate.	Weekly, ----	Daily.	
63	A. P. Maignen, semi-slow sand, ------	6	6.0	4 days	------		+	+	—	None, ------	Occasional,	Weekly.	
64	J. W. Ledoux, pressure rapid sand, --	4	2.0	48 hrs.	------					None, ------	Frequent, --	Daily.	
65	Warren, rapid sand, ------	6	2.4	60-72 hrs.	------	—	—	—	+	None, ------	Frequent, --	Daily.	
66	Slow sand, ------	3	1.6	60-72 hrs.	------	+	—	—	—	None, ------	Frequent, --	Daily.	
67	J. W. Ledoux, pressure rapid sand, --	10	5.4	48 hrs.	------					None, ------	Frequent, --	Daily.	
68	Warren and Norwich Eng. Co., rapid sand.	12	6.0	None	------	—	+	—	+	None, ------	Occasional,	Occasional,	Sed. in dam.
69	J. H. Fuertes, slow sand, ------	3	3.0	15 min.	4	+	+	+	+	Calcium oxide.	Monthly, --	Daily.	
70	Pitts. Fil. Mfg. Co., rapid sand, ------	8	4.0	1.25 hrs.	4	+	—	+	—	None, ------	None, ------	None.	
71	Roberts Filter Mfg. Co., rapid sand,	6	3.0	2 hrs.	------	+	+	—	+	None, ------	Occasional,	Occasional,	
72	N. Y. Cont. Jewell & Roberts, rapid sand.	3	1.5	20 min.	------	+	+	—	—	None, ------	Occasional,	Occasional,	
73	Pitts. Fil. Mfg. Co., rapid sand, ----	4	3.0	12 min.	10.0	—	—	—	+	None, ------	Occasional,	Occasional,	Sed. in dam.
74	A. M. W. and G. Co., rapid sand, --	6	3.0	2.5 hrs.	2.2	+	+	+	+	None, ------	Weekly, ----	Daily.	
75	Pitts. Fil. Mfg. Co., rapid sand, ----	2	1.0	None	------	—	—	—	+	None, ------	Occasional,	Occasional,	
76	Warren Jewell, rapid sand, ------	1	0.3	0.5 hrs.	3.0	—	+	—	+	None, ------	None, ------	None.	
77	Pitts. Fil. Mfg. Co., rapid sand, ------	10	10.0	7 hrs.	2.5	+	+	+	+	None, ------	Weekly, ----	Daily.	
78	Morison and Jewell, rapid sand, ------	20	8.0	None	------	—	+	—	—	None, ------	Semi-weekly	Semi-weekly	
79	Morison and Jewell, rapid sand, ------	12	6.0	None	------	—	+	—	—	None, ------	Semi-weekly	Semi-weekly	Peat colored water.
80	N. Y. Cont. Jewell, rapid sand, ------	12	9.0	10 days	2.0	+	+	+	+	None, ------	Weekly, ----	Daily.	

Instructive Information About Filtered Water Supplies.

From the chart submitted it is noted that there are eighty filtration plants furnishing water to the public within the State of Pennsylvania. In construction these 80 purification plants represent three types as follows:

Slow-sand,	12
Semi-slow sand,	4
Rapid sand,	64
Total,	80

The following table shows the capacity and delivery of each type of plant:

Capacity 12 slow sand plants,	445.35 mil. gals. or 67.96%
Capacity 4 semi-slow sand plants,	17.80 mil. gals. or 2.72%
Capacity 64 rapid sand plants,	192.15 mil. gals. or 29.32%
Total Capacity 80 filtration plants,	655.30 mil. gals. or 100%
Delivery 12 slow sand plants,	444.38 mil. gals. or 77.00%
Delivery 4 semi-slow sand plants,	12.00 mil. gals. or 2.08%
Delivery 64 rapid sand plants,	120.72 mil. gals. or 20.92%
Total Delivery 80 filtration plants,	577.10 mil. gals. or 100%

Nineteen of the 80 water purification plants are operated by municipalities and 61 are operated by companies. The 19 municipal filtration plants have a capacity of 475.55 million gallons, which is 72.57% of the total capacity of the 80 plants. The municipal deliver 472.045 million gallons which is 81.79% of all water filtered. The 61 company plants have a capacity of 179.75 million gallons, which is 27.43% of the total capacity of the 80 plants. The company plants deliver 105,055 million gallons which is 18.21% of all water filtered.

During 1910 twelve new water filtration plants were placed in operation. These plants are of the following types:

Slow sand,	2
Rapid sand,	10
Total,	12

The capacity and delivery of these new plants according to type is as follows:

Capacity 2 slow sand plants,	73.75 mil. gals. or 72.13%
Capacity 10 rapid sand plants,	28.50 mil. gals. or 27.87%
Total Capacity 12 new plants,	102.25 mil. gals. or 100%
Delivery 2 slow sand plants,	71.2 mil. gals. or 75.99%
Delivery 10 rapid sand plants,	22.5 mil. gals. or 24.01%
Total Delivery 12 new plants,	93.7 mil. gals. or 100%

The twelve new plants increased the total capacity over 1909 by 18.49% and increase the total amount delivered by 19.38%.

Of the twelve plants placed in operation during 1910, two were municipal slow sand plants and ten were company rapid sand plants. The municipal plants have a capacity of 73.75 million gallons and deliver 71.2 million gallons. The company plans have a capacity of 28.5 million gallons and deliver 22.5 million gallons.

The population of the State of Pennsylvania according to the 1910 census is as follows:

Total State population,	7,665,111
Total urban population,	4,630,669 or 60.41%
Total rural population,	3,034,442 or 39.59%

The population of the districts in which filter plants are operated is 3,573,200 or 46.62% of the total population and 77.16% of the urban population.

The population of these districts is served by the three types of filter plants as follows:

District population served by slow sand plants,	2,171,600 or 60.77%
District population served by semi-slow sand plants,	91,500 or 2.56%
District population served by rapid sand plants,	1,310,100 or 36.67%

The population receiving filtered water, known as consumers, is 3,049,950 or 49.79% of the total population and 65.86% of the urban population.

The consumers are served filtered water from the three types of plants as follows:

Consumers served by slow sand plants,	1,937,600 or 63.53%
Consumers served by semi-slow sand plants,	85,000 or 2.79%
Consumers served by rapid sand plants,	1,027,350 or 33.68%

The population of the districts served by the twelve new filtration plants is 576,900. This is an increase over 1909 of 19.25%. The population receiving filtered water from the twelve new plants is 467,100. This is an increase over 1909 of 18.08%.

The district population and the number of consumers served by the twelve new filtration plants according to type is as follows:

District population served by slow sand plants,	314,000 or 54.43%
District population served by rapid sand plants,	262,900 or 45.57%
Consumers served by slow sand plants,	293,500 or 62.84%
Consumers served by rapid sand plants,	173,600 or 37.16%

The district population served by the nineteen municipal and sixty-one company filtration plants according to type is as follows:

District population served by municipal sand plants,	2,143,000 or 91.54%
District population served by municipal semi-slow sand plants,	50,000 or 2.14%
District population served by rapid sand plants,	148,000 or 6.32%
District population served by company slow sand plants,	28,600 or 2,32%
District population served by company semi-slow sand plants,	41,500 or 3.37%
District population served by company rapid sand plants,	1,162,000 or 94.31%

The number of consumers receiving filtered water from the three types of municipal and company water purification plants are as follows:

Consumers served by municipal slow sand plants,	1,914,500 or 90.92%
Consumers served by municipal semi-slow sand plants,	48,000 or 2.28%
Consumers served by municipal rapid sand plants,	143,100 or 6.80%
Consumers served by company slow sand plants,	23,100 or 2.45%
Consumers served by company semi-slow sand plants,	37,000 or 3.92%
Consumers served by company rapid sand plants,	884,250 or 93.63%

The two slow sand municipal plants placed in operation in 1910 serve a district having a population of 314,000 and consumers numbering 293,500. The ten company plants serve a district of 262,900 and consumers numbering 173,600. Thus the municipal plants have increased the total district population over the year 1909 by 10.48% and the number of consumers by 11.36%, while the company plants have increased the district population by 8.77% and the number of consumers by 6.72%.

The sources of water supply for the eighty filtration plants and the number of municipal and company plants using each source are designated in the following tables:

Sources	Municipal	Companies	Total
Rivers,	10	24	34
Small streams,	7	26	33
Streams and wells,	1	4	5
Rivers and small streams,	0	2	2
Streams and springs,	1	1	2
Rivers and springs,	0	1	1
Small streams and lakes,	0	2	2
Wells,	0	1	1
Total,	19	61	80
Surface water only,	17	54	71
Ground waters only,	0	1	1
Combined surface and ground waters,	2	6	8
Totals,	19	61	80

The sources of supply for the district population receiving filtered water from municipal and company plants are shown in the following table:

Sources	Municipal	Companies	Total
Rivers,	2,167,000	502,600	2,669,600
Small streams,	160,500	673,000	833,500
Streams and wells,	11,000	12,600	23,600
Rivers and small streams,	0	25,000	25,000
Streams and springs,	2,600	5,000	7,600
Rivers and springs,	0	6,600	6,600
Small streams and lakes,	0	3,300	3,300
Wells,	0	4,000	4,000
Totals,	2,341,100	1,232,100	3,573,200

In the following table is shown the source of water supply used by each of the three types of filtration plants and the district population and number of consumers served by each type:

	Population of District	Consumers
12 Slow sand plants using surface waters,	2,171,600	1,937,600
0 Slow sand plants using ground waters and using ground and small stream waters,	None	None
4 Semi-slow sand plants using surface waters,	91,500	85,000
0 Semi-slow sand plants using ground waters and using ground and small stream waters,	None	None
53 Rapid sand plants using surface waters,	1,268,300	994,300
11 Rapid sand plants using ground waters and using ground and small stream waters,	41,800	33,050

Sewage Disposal Plants

There were 39 sewage disposal plants in operation within the State in 1910 and 12 sewage disposals were under construction. Eighteen of the disposals in operation were inspected. The inspections were made to learn the construction method of operation and efficiency of the plants.

Difficulty is being encountered as elsewhere in this country with respect to the employment of men properly trained and fitted to faithfully and efficiently operate and maintain a sewage purification plant after it is properly designed, constructed and put into commission. The engineer who builds the works is not retained to supervise the operation for a period of months during which he could train the attendant and finally leave the works in charge of a man better fitted to operate them than one totally lacking training and hence it must be an up hill undertaking for the State to bring about uniform and reasonably satisfactory standards of operation, especially at small plants. That this will be accomplished finally is not gainsaid, but during the first years in the State's campaign to establish purification works, results must necessarily be overlooked that will finally be absolutely inadmissible when many plants are established and many operators are employed and have the benefits of correspondence and co-opration and possible association as superintendents on sewage disposal works.

The operators in the various plants are as a whole untrained. The only source of information for these men, of such a nature as appeals to them, is that of the State Department of Health.

The use of the methylene blue stability determination is becoming popular among sewage disposal operators. This simple test is proving of especial benefit to those operating disposals having sprinkling filters and contract beds without final treatment upon sand. This stability test is of more value to the ordinary operators at the present time than the results of bacteriological analyses.

In the following table are shown the 39 disposals in operation 1910.

1. Allegheny City Home.
2. Allegheny County Work House.
3. Altoona City.
4. Bryn Athyn Village Association, Moreland Township, Montgomery County.
5. Chester Springs Soldiers Orphan Schools, West Pikeland Twp., Chester County.
6. Devon Drainage Company, Devon.
7. Dermandy Sanatorium, Morton, Delaware County.
8. Derry Borough.
9. Dixmont Hospital for the Insane.
10. East Washington Borough.
11. Enola Sewage Company, Enola.
12. Hanover Sewer Co., Hanover.
13. Haverford College, Haverford Twp., Delaware Co.
14. J. W. & A. P. Howard Tanning Co., Corry.
15. Jewish Sanatorium for Consumptives, Eagleville.
16. Morrisville Rubber Works, Morrisville.
17. Mt. Gretna Park, Mt. Gretna.
18. Nelson Valve Co., Springfield Twp., Montgomery Co.
19. New Jersey Zinc Co., Palmerton Village.
20. Palmer Land Company, Palmerton Village.
21. Penna. Glue Company, Springdale.
22. Penna. State South Mountain Sanatorium, Mt. Alto.
23. Pittsburgh Municipal Water Works at filtration plant, Aspinwall.
24. Reading City.
25. Soldiers Orphans Industrial School, Scotland.
26. State Hospital for the Insane, Danville.
27. State Institution for Feeble Minded of Western Pennsylvania, Polk.
28. State Asylum for the Chronic Insane of Penna., South Mountain, Wernersville.
29. Stoneham Tannery—Elk Tanning Có.—Stoneham.
30. The Eastern Penna. State Institution for Feeble Minded and Epileptic, Spring City.
31. Tressler Orphan's Home, Loysville.
32. Villanova College, Villanova.
33. White Haven Sanatorium, Free Hospital for Poor Consumptives, White Haven.
34. Williamson Trade School, Middletown Twp., Delaware Co.
35. Warren Water Co. for filter plant, Warren.
36. Wayne Sewage Co., Wayne.
37. Washington Borough.
38. Willow Grove Park, Moreland Twp., Montgomery Co.
39. Willow Grove, Parkside Hotel.

Eighteen plants examined during the year were as follows:

1. Allegheny City Home.
2. Allegheny County Work House.
3. Bryn Athyn Village Association, Moreland Township, Montgomery County.
4. Derry Borough.
5. Enola Sewage Co., Enola.
6. J. W. & A. P. Howard Tanning Co., Corry.
7. Mt. Gretna Park, Mt. Gretna.
8. New Jersey Zinc Co., Palmerton Village.
9. Palmer Land Company, Palmerton Village.
10. Reading City.
11. Stoneham Tannery—Elk Tanning Co.—Stoneham.
12. Soldier's Orphan Industrial School, Scotland.
13. The Eastern Penna. State Institution for Feeble Minded and Epileptic, Spring City.
14. Tressler Orphan's Home, Loysville.
15. Wayne Sewerage Co., Wayne.
16. Washington Borough.
17. White Haven Sanatorium, Free Hospital for Poor Consumptives, White Haven.
18. Williamson Trade School, Middletown Twp., Delaware County.

The thirteen plants under construction are the following:

1. Doylestown Sewerage Co., new plant, Doylestown.
2. House of Refuge of Eastern Pennsylvania, Middletown Twp., Delaware County.
3. Indiana Borough.
4. Lehigh County Home and Alms House, South Whitehall Twp., Lehigh County.
5. New Wilmington Borough.
6. Perkasie, Phillip Cressman, owner.
7. Penna. Industrial Reformatory near Huntingdon, Huntingdon County.
8. Philadelphia, Pennypacker District.
9. Penna. Reform School, Morganza.
10. State Lunatic Hospital, Harrisburg.
11. South Wayne, Wayne.
12. State Homeopathic Hospital for the Insane, Rittersville.
13. State Hospital for the Insane, Norristown.

Water Sample Collections

During the year 720 requisitions were issued for the collection of water samples from public and individual water supplies and 4,532 samples were collected. The samples represent collections in every county in the State except Cameron, Carbon, Centre, Perry and Union Counties. Eighteen hundred and twenty-eight samples were collected at nine places as follows: Three hundred and forty-two at Brookville; 105 at Chester; 294 at Danville; 184 at Huntingdon; 273 at Mt. Alto; 138 at Spring City; 187 at Washington; 146 at Wilkes-Barre and 159 at Wormleysburg. Two thousand seven hundred and seven samples were collected by officers of this division. The majority of the other samples were collected by individuals, suspecting that the individual water supply used by their households was the cause of a water borne disease. When an individual supply showed the presence of sewage organisms the owner or tenant upon the property where the supply was located was informed concerning the making of improvements. Acting upon the advice of the Department many individual supplies were improved and protected against further apollution.

17. SPECIAL WORK

During the year the Department completed a series of experiments on the handling of the tannery wastes at Corry made with a special view of determining a feasible way of intercepting and destroying the infectious organism B. anthracis.

Further sanitary surveys on the Allegheny River watershed were prosecuted in connection with the preservation of the purity and potability of the waters of this river for the supply to the public in the Pittsburgh district.

By request of the State Board of Health of New Jersey, an inspector was assigned to make an investigation of the sources of ice supply in Pennsylvania from which ice is harvested and delivered for consumption in the State of New Jersey. The inspector did this work in company with an inspector sent for the purpose from the New Jersey State Board of Health.

An investigation of the discharge of spent acid liquors into the Conemaugh River from the Cambria Steel Company's works at Johnstown and from the manufacturing plants at Vandegrift into the Kiskiminetas River was made by the Department during the summer.

IV. FIELD INSPECTION

There are three distinct kinds of work performed by the sanitary inspectors.

The first is a detailed work of stream preservation and is on the upland water-sheds sparsely populated and of small area, where inspection and patrol can easily prevent the waters of the State from being polluted, except by accident.

The second is the less particular work on large watersheds whereon may be located villages, towns and cities, the drainage of which goes into a stream subsequently used as a source of public water supply. The refinements in sanitation readily accepted as practicable for the upland watersheds would be impracticable if enforced on these lower watersheds. In the latter instance two safeguards are necessary; the diminution of sewage pollution as far as practicable, and the filtration of the water supply.

The third kind of work of the field officers relates to various insanitary conditions with respect to disposal of household wastes and causes of disease and mortality within or without villages, boroughs and cities more fully mentioned under the heading "General Sanitation."

The improvement of watersheds whose yield is wholly or materially drawn upon for public domestic consumption has demanded and received attention in one hundred and seven instances, involving the water supply of seven cities, eighty-seven boroughs, seventeen of which are county seats, twelve villages, one industrial supply and one township of the first class.

18. IMPROVEMENT OF WATERSHEDS.

There were inspected and reinspected during the year of 1910, properties totaling ninety-two thousand, five hundred and eighty-two, located on one hundred and forty-five watersheds. Of the ninety-two thousand, five hundred and eighty-two properties, all were found satisfactory except twenty-one thousand and forty-four. Abatement of nuisances totaling twenty-three thousand, seven hundred and seventy-seven were effected on ten thousand five hundred and seventy-nine of these properties.

At th close of the year there were ten thousand, four hundred and sixty-five properties upon which nuisances remained unabated. This was largely due to the fact that the inspections were made in the fall and winter, and written orders of abatements were not served in time for changes to be made before the New Year.

The seven cities whose watersheds were inspected and reinspected are as follows: Allentown, Altoona, Lancaster, New Castle, Reading, Wilkes-Barre and Philadelphia suburbs.

1. The City of Allentown, Lehigh County, secures its supply from the watersheds drained by Jordan Creek and Little Lehigh River. Seventy-seven unsatisfactory properties were reinspected, and one hundrd and forty-eight pollutions were abated on sixty-seven unsatisfactory properties, leaving at the close of the year ten unsatisfactory properties.

2. The City of Altoona, Blair County, is supplied with water from Burgoon and Baker Runs. One unsatisfactory property on the watershed of Baker Run was reinspected and abated, leaving all property in a satisfactory condition at the end of the year.

3. Lancaster City, Lancaster County, is supplied with water from the Conestoga Creek. Ten unsatisfactory properties were found on the watershed, and eighteen pollutions were removed from four unsatisfactory properties, leaving six unsatisfactory properties at the end of the year, one of which was referred to the Department's Attorneys.

4. New Castle, Lawrence County, is supplied with water from the Shenango River. Fifty-six unsatisfactory properties were reinspected and forty-seven pollutions were removed upon thirty-two properties, leaving twenty-four properties unchanged at the end of the year.

5. Philadelphia suburbs are supplied with water by the Springfield Consolidated Water Company. Seventeen hundred and eighty-one properties on the watersheds of Pennypack, Crum, Neshaminy and Pickering Creeks were reinspected, and three hundred and fifty-eight pollutions were removed upon two hundred and one unsatisfactory properties, leaving one hundred and forty-three properties unchanged at the end of the year.

6. The City of Reading, Berks County, is supplied with water from Maiden, Antietam, Bernhart, Engelman and Angelica Creeks. Thirty unsatisfactory properties on the watersheds were inspected, and twenty-nine pollutions upon eighteen properties were removed, leaving twelve unsatisfactory properties at the close of the year.

7. The City of Wilkes-Barre, Luzerne County and its suburbs, are supplied with water by the Spring Brook Water Supply Company. One thousand and forty-one properties on the watersheds were inspected, and thirty-one pollutions removed upon twenty-one estates, leaving thirty-nine unsatisfactory properties on the watershed at the close of the year.

The seventeen boroughs which are County seats whose watersheds were inspected are as follows:

1. Bedford borough is the county seat of Bedford County, and is supplied with water from Buffalo Creek. Eight hundred and seventy-eight properties on the watershed were inspected and all but one hundred and fifty-one found in a satisfactory condition. Three hundred and ten pollutions were removed upon one hundred and forty-four estates, leaving seven properties in an unsatisfactory condition at the close of the year.

2. Bloomsburg borough is the county seat of Columbia County, and is supplied with water from Fishing Creek. Five unsatisfactory properties on the watershed were reinspected and twenty-two pollutions upon the five unsatisfactory properties were removed, leaving the watershed in good condition at the close of the year.

3. Brookville borough is the county seat of Jefferson County, and is supplied with water from North Fork Creek. Seventy-eight unsatisfactory properties on the watershed were reinspected, and ninety-three pollutions on the seventy-eight unsatisfactory properties were abated, leaving all the properties on the watershed in good condition at the close of the year.

4. Butler borough is the county seat of Butler County, and is supplied with water from Connoquenessing Creek. Ninety-four unsatisfactory properties were reinspected, and one hundred and three pollutions removed upon forty-two estates, leaving fifty-two properties in an unsatisfactory condition at the close of the year.

5. Carlisle borough is the county seat of Cumberland County, and is supplied with water from the Connedoguinet Creek. Fifty-five unsatisfactory properties on the watershed were reinspected, and one hundred and three pollutions removed upon forty-five estates, leaving ten properties in an unsatisfactory condition at the close of the year.

6. Ebensburg borough is the county seat of Cambria County, and is supplied with water from Black Lick Creek. One property on the watershed was investigated and found to be in a satisfactory condition.

7. Honesdale borough is the county seat of Wayne County, and is supplied with water from Balcom Creek and Cadjaw Pond. Thirty-seven properties on the watershed were inspected, and all but five found to be satisfactory condition.

One pollution was removed from one property, leaving four properties in an unsatisfactory condition at the close of the year.

8. Huntingdon borough is the county seat of Huntingdon County, and is supplied with water from Standing Stone Creek. Three unsatisfactory properties on the watershed were reinspected, and five pollutions existing thereon were removed, leaving all properties in a satisfactory condition at the close of the year.

9. Indiana borough is the county seat of Indiana County, and is supplied with water from Two Lick Creek. Seven hundred and ninety-nine unsatisfactory properties were reinspected, and one thousand three hundred and fifty-two pollutions removed from seven hundred and eighty-three unsatisfactory properties, leaving sixteen unsatisfactory properties at the close of the year, one of which was referred to the Department's Attorney.

10. Lewistown borough is the county seat of Mifflin County, and is supplied with water by the Lewistown and Reedsville Water Company, which takes water from Minehart, Treasters, Coopers Gap and Laurel Runs. The Minehart Run watershed in uninhabited. On the watershed of Treasters Run four properties were inspected, one of which was unsatisfactory, remaining unchanged at the close of the year. On the watershed of Coopers Gap Run, one property was inspected and was found to be in a satisfactory condition. On the watershed of Laurel Run one property was inspected and found to be in a satisfactory condition, leaving all but one of the properties in a satisfactory condition at the close of the year.

11. McConnellsburg borough is the county seat of Fulton County, and is supplied with water by the McConnellsburg Water Company from a spring run, the watershed of which is uninhabited.

12. Montrose borough is the county seat of Susquehanna County and is supplied with water from Jones Lake. Fifteen properties on the watershed were inspected, and all but five were found to be in a satisfactory condition. One pollution upon one property was abated, leaving four properties unchanged at the close of the year.

13. Smethport borough is the county seat of McKean County, and is supplied with water from Blacksmith and Sheridan Creeks, and three drilled wells, as is, also, East Smethport. The watersheds of these two creeks above the intake are reported to be uninhabited.

14. Stroudsburg borough is the county seat of Monroe County, and is supplied with water from Brodhead Creek. Five unsatisfactory properties on the watershed were reinspected, and two pollutions upon two properties were removed, leaving three unsatisfactory properties at the close of the year, one of which was referred to the Department's Attorneys.

15. Sunbury borough is the county seat of Northumberland County, and is supplied with water from Little Shamokin Creek. Two hundred and ninety-two properties on the watershed were inspected and all but twenty-seven found to be in a satisfactory condition. This inspection was made late in the year, and all the unsatisfactory properties remained unchanged at the close of the year.

16. Warren borough is the county seat of Warren County, and is supplied with water from the Allegheny River and Morrison Run. On the watershed of Morrison Run is a lumber camp, which was inspected and reported to be in an unsatisfactory condition. The matter was referred to the Department's Attorneys and the nuisance was abated. Eight properties on the watershed of the Allegheny River, in the vicinity of the Warren Water Company's intake, were inspected, and eight pollutions removed from seven unsatisfactory properties. The one unsatisfactory property, which was referred to the Department's Attorney remained unchanged at the close of the year.

17. West Chester borough is the county seat of Chester county, and is supplied with water from Chester Creek. Eighty-six properties on the watershed were inspected and all but eight were found in a satisfactory condition. Sixteen pollutions were removed upon six of the unsatisfactory properties, leaving two unsatisfactory properties unchanged at the close of the year. On the watersheds of Valley Creek and Broad Run, a proposed supply to the Borough of West Chester, three hundred and seventy-nine properties were inspected and all but fifty-five were found in a satisfactory condition. One hundred and four pollutions, upon forty-four unsatisfactory properties, were removed, leaving eleven unsatisfactory properties at the close of the year.

The seventy other boroughs whose watersheds were inspected are as follows:

1. Ashland borough, Schuylkill County, is supplied with water from Little Mahanoy Creek. Three hundred and three properties on the watershed were inspected, and all but one hundred and fifty were found in a satisfactory condition. Thirty-four pollutions upon sixteen unsatisfactory properties were abated, leaving one hundred and thirty-five unsatisfactory properties unchanged at the end of the year.

2. Bangor borough, Northampton County, is supplied with water from Martins Creek. Four properties were inspected on the watershed and found unsatisfactory, and remained unchanged at the close of the year.

3. Barnesboro borough, Cambria County, is supplied with water by the Northern Cambria Water Company from Browns Run. Three properties on the watershed were inspected and found to be in a satisfactory condition.

4. Bath borough, Northampton County, is supplied with water from the Monocacy Creek. Seven properties on the watershed were inspected from the one found in a satisfactory condition. The one unsatisfactory property remained unchanged at the close of the year.

5. Bechtelsville borough, Berks County, is supplied with water from springs and wells. There is no public water works system.

6. Bernville borough, Berks county, is supplied with water from individual wells, springs and cisterns. There is no public water works system.

7. Berwick borough, Columbia County, is supplied with water from Varner's Run. Thirty-five properties on the watershed were inspected, and all but sixteen were found in a satisfactory condition. Thirty-three pollutions were abated upon the sixteen unsatisfactory properties, leaving all the properties on the watershed in a satisfactory condition at the close of the year.

8. Bristol borough, Bucks County, is supplied with unfiltered water by the Bristol Water Company from the Delaware River.

9. Brockwayville borough, Jefferson County, is supplied with water from Whetstone Creek. The watershed is reported uninhabited. The watershed at Rattlesnake Run, a proposed supply to Brockwayville borough, is also reported uninhabited.

10. Canonsburg borough, Washington County, is supplied with water from Chartiers Creek. Eighty unsatisfactory properties were reinspected, and eighty-six pollutions were removed upon sixty-four unsatisfactory properties, leaving sixteen unsatisfactory properties unchanged at the close of the year.

11. Canton borough, Bradford County, is supplied with water from Mill Creek and Lake Breeze. Forty-eight properties on the watershed were inspected and all but four found to be in a satisfactory condition, the four unsatisfactory properties remaining unchanged at the close of the year.

12. Centerport borough, Berks County, does not have a public water supply, dug wells being in general use.

13. Coatesville borough, Chester County, is supplied with water from Sucker Run. One hundred and five properties on the watershed were inspected, and all but twenty-eight found to be in a satisfactory condition. Sixty-three pollutions were removed upon twenty-six unsatisfactory properties,leaving two unsatisfactory properties unchanged at the close of the year.

14. Connellsville borough, Fayette County, is supplied with water from the Youghiogheny River. Eight hundred and eighty properties on the watershed were inspected and all but three hundred and twenty-eight found in a satisfactory condition. Two hundred and fifty-nine pollutions were removed upon one hundred and thirty-one unsatisfactory properties, leaving one hundred and ninety-seven properties unchanged at the close of the year.

15. Dauphin borough, Dauphin County, is supplied with water by the Dauphin Consolidated Water Company, from Stony, Powells and Clark Creeks. On the watershed at Powells Creek eighty properties were inspected and all but four were found in a satisfactory condition, remaining unchanged at the close of the year. On the watershed at Stony Creek eighty-two properties were inspected and all but twelve were found to be in a satisfactory condition, remaining unchanged at the close of the year. Clark Creek not inspected this year. The Dauphin Consolidated Water Company also furnishes water to East Pennsboro Township, Cumberland County, Susquehanna and Middle Paxton Township, Dauphin County, and to the Pennsylvania Railroad Company.

16. Downingtown borough, Chester County, is supplied with water from a tributary of Brandywine Creek. Twenty-two properties on the watershed were inspected and all but eight were found in a satisfactory conditions. Seven pollutions were abated on four unsatisfactory properties, leaving four unsatisfactory properties on the watershed at the end of the year.

17. Dundaff borough, Susquehanna County, does not have a public water supply, private wells and springs being used as a source of supply.

18. East Bangor borough, Northampton County, is supplied with water from Martins Creek. Four properties on the watershed were inspected and found unsatisfactory, and remained unchanged at the close of the year.

19. Eldred borough, McKean County, is supplied with water by the Galeton-Eldred Water Company, from springs located in Ceres Township, McKean County. This water supply is reported to be in a satisfactory condition.

20. Falls Creek borough, Clearfield County, is supplied with water from Falls Creek. One hundred and twenty properties on the watershed were inspected, and all but seven were found to be in a satisfactory condition. Seven pollutions on the seven unsatisfactory properties were abated, leaving all properties on the watershed in a satisfactory condition at the close of the year.

21. Forest City, Susquehanna County, is supplied with water from the Lackawanna River by the Scranton Gas & Water Company. Four hundred and fifty properties on the watershed were inspected and all but twenty-one were found to be in a satisfactory condition. Nineteen pollutions upon fourteen unsatisfactory properties were removed leaving seven unsatisfactory properties unchanged at the close of the year.

22. Friendsville borough, Susquehanna County, does not have a public water works system, private wells and springs being used as a source of supply.

23. Great Bend borough, Susquehanna County, is supplied with water from DuBois Creek. Sixty-nine properties on the watershed were inspected and all but one were found in a satisfactory condition. Two pollutions on the one unsatisfactory property were removed, leaving the watershed in a satisfactory condition at the close of the year.

24. Glen Rock borough, York County, is supplied with water from a tributary to Codorus Creek. Four properties on the watershed were inspected and all but one was found to be in a satisfactory condition. The unsatisfactory property was referred to the Department's Attorneys and the four pollutions were abated, leaving all properties on the watershed in a satisfactory condition at the close of the year.

25. Halifax borough Dauphin County, is supplied with water from springs located in the mountains near Halifax borough. Reported to be in a satisfactory condition.

26. Hallstead borough, Susquehanna County, is supplied with water from DuBois Creek. Sixty-nine properties on the watershed were inspected, and all but one was found to be in a satisfactory condition. The two pollutions upon one unsatisfactory property were removed, leaving all properties on the watershed in a satisfactory condition at the close of the year.

27. Hanover borough, York County, is supplied with water by the Hanover and McSherrystown Water Company from Little Conewago Creek. Fifty-two unsatisfactory properties on the watershed were reinspected, and seventy-seven pollutions upon forty-one unsatisfactory properties were removed, leaving eleven unsatisfactory properties unchanged at the close of the year.

28. Hop Bottom borough, Susquehanna County, does not have a public water works system, private wells and springs being used as a source of supply.

29. Hummelstown borough, Dauphin County, is supplied with water from Swatara Creek. Twelve thousand and thirty-one properties on the watershed were inspected and all but seven hundred and seventy-nine were found to be in a satisfactory condition. One thousand one hundred and fourteen, pollutions upon five hundred and eight unsatisfactory properties were removed, leaving two hundred and ninety-two unsatisfactory properties unchanged at the close of the year.

30. Jermyn borough, Lackawanna County, is supplied with water by the Scranton Gas and Water Company and Rush Brook. Fifty-nine properties on the watershed were inspected and all but three were found to be in a satisfactory condition. The three unsatisfactory properties remained unchanged at the close of the year.

31. Jonestown borough, Lebanon County, is supplied with water from drilled and dug wells, which are reported to be in a satisfactory condition.

32. Lenhartsville borough, Berks County, does not have a public water works system, private wells being in general use.

33. Little Meadows borough, Susquehanna County, does not have a public water works system, private wells and springs being used as a source of supply.

34. McDonald borough, Washington County, is supplied with water from Raccoon Creek. Two hundred and forty-one unsatisfactory properties.on the watershed were reinspected and four hundred and thirteen pollutions upon two unsatisfactory properties unchanged at the close of the year.

35. McSherrystown borough, Adams County, is supplied with water by the Hanover and McSherrystown Water Company. The source of supply is the same as that of Hanover borough, York County, and is reported under Hanover borough.

36. Marianna borough, Washington County, is supplied with water from the North Fork of Ten Mile Creek. Nine hundred and sixty-four properties on the watershed were inspected and all but two hundred and sixty-five were found to be in a satisfactory condition. Two hundred and ninety-six pollutions upon one hundred and sixty-seven unsatisfactory properties were removed, leaving ninety-eight unsatisfactory properties unchanged at the close of the year.

37. Middletown borough, Dauphin County, is supplied with water from the Swatara Creek. Twelve thousand eight hundred and fifty-one properties on the watershed were inspected, and all but eight hundred and sixty-seven were found to be in a satisfactory condition. One thousand one hundred and ninety-six pollutions upon five hundred and sixty-two unsatisfactory properties were removed, leaving three hundred and eleven properties upon which nuisances exist, unchanged at the close of the year.

38. Millersburg borough, Dauphin County, is supplied with water from Little Wiconisco Creek. Two hundred and fifteen properties on the watershed were inspected and all but four were found to be in a satisfactory condition. The four unsatisfactory properties remained unchanged at the close of the year.

39. Millheim borough, Centre County, is supplied with water by the Millheim Water Company from a small spring run, the watershed of which is reported to be uninhabited.

40. Morrisville borough, Bucks County, is supplied with water pumped from the Delaware River to a settling basin and thence to the consumers in an unfiltered state.

41. Mount Joy borough, Lancaster County, is supplied with water from the Little Chiquesalunga Creek. Four hundred and ninety-six properties on the watershed were inspected and all but thirty were found to be in a satisfactory condition. Sixty-nine pollutions upon twenty-eight unsatisfactory properties were removed, leaving two unsatisfactory properties unchanged at the close of the year.

42. Mount Pleasant borough, Westmoreland County, is supplied with water from Jacob Creek. Thirty-nine unsatisfactory properties on the watershed were reinspected and twenty-one pollutions upon seventeen unsatisfactory properties removed, leaving twenty-two unsatisfactory properties unchanged at the close of the year, one of which was referred to the Department's Attorneys.

43. New Bethlehem borough, Clarion County, is supplied with water from Red Bank and Sandy Lick Creeks. Five thousand three hundred and forty properties on the watersheds were inspected, and all but nine hundred and sixteen were found to be in a satisfactory condition. One thousand, one hundred and seventy-nine pollutions upon seven hundred and ninety-three unsatisfactory properties were removed leaving one hundred and twenty-three unsatisfactory properties unchanged at the close of the year.

44. New Hope borough, Bucks County, does not have a public water works system, the supply being taken from private wells.

45. New Milford borough, Susquehanna County, is supplied with water from East Lake Creek. One unsatisfactory property on the watershed was reinspected and placed in a satisfactory condition.

46. Nicholson borough, Wyoming County, is supplied with water from Horton's Creek. Two unsatisfactory properties on the watershed were reinspected, and one pollution upon one unsatisfactory property was removed, leaving one unsatisfactory property unchanged at the close of the year.

47. Oswayo borough, Potter County, is supplied with water by the Oswayo Water Company from a number of walled and covered springs, which are reported to be in a satisfactory condition.

48. Pine Grove borough, Schuylkill County, is supplied with water by the Pine Grove Water Company from Black Creek springs. The watershed is reported to be uninhabited.

49. Port Allegany borough, McKean County, is supplied with water by the Port Allegany Water Company from four reservoirs, the watersheds of which are reported to be uninhabited. The borough has recently drilled four artesian wells as an emergency supply.

50. Portland borough, Northampton County, is supplied with water from Slateford Creek. Thirteen properties on the watershed were inspected, and all but one was found to be in a satisfactory condition, the one unsatisfactory property remaining unchanged at the close of the year.

51. Punxsutawney borough, Jefferson County, is supplied with water from East Mahoning Creek. Eleven unsatisfactory properties on the watershed were reinspected, and fifteen pollutions upon six unsatisfactory properties were removed, leaving five unsatisfactory propertties unchanged at the close of the year.

52. Quakertown borough, Bucks County, is supplied with water from Tohickon Creek. Two hundred and twenty-four properties on the watershed were inspected, and all but one was found to be in a satisfactory condition. Four pollutions upon the one unsatisfactory property were removed, leaving all the properties on the watershed in a satisfactory condition at the close of the year.

53. Richlandtown borough, Bucks County, does not have a public water works system, private wells being used as the only source of supply.

54. Royalton borough, Dauphin County, uses as an emergency supply, water furnished from the Swatara Creek at Middletown. Report of watershed inspection given under Middletown.

55. Schuylkill Haven borough, Schuylkill County, is supplied with water from Panther Run. Seventeen properties on the watershed were inspected and all but three were found to be in a satisfactory condition. Five pollutions upon two unsatisfactory properties were removed, leaving one unsatisfactory property unchanged at the close of the year.

56. Scottdale borough, Westmoreland County, is supplied with water from Indian Creek. Sixty-eight properties on the watershed were reinspected and sixty-nine pollutions upon fifty unsatisfactory properties were removed, leaving eighteen unsatisfactory properties unchanged at the close of the year.

57. Selinsgrove borough, Snyder County, is supplied with water from Penn's Creek. Twenty unsatisfactory properties on the watershed were reinspected, and twenty-two pollutions upon ten unsatisfactory properties were removed, leaving ten unsatisfactory properties unchanged at the close of the year.

58. Shickshinny borough, Luzerne County, is supplied with water from Valley Creek. Twenty properties on the watershed were inspected, and all but three were found to be in a satisfactory condition. The three unsatisfactory properties remained unchanged at the close of the year.

59. Shippensburg borough, Cumberland County, is supplied with water from two mountain streams, the watersheds of which are reported to be uninhabited.

60. Shrewsbury borough, York County, is supplied with water from springs, which are reported to be in a satisfactory condition.

61. South Fork borough, Cambria County, is supplied with water from Sandy Run. Forty-three properties on the watershed were inspected and all but nine were found to be in a satisfactory condition. Eighteen pollutions upon eight unsatisfactory properties were removed, leaving one unsatisfactory property unchanged at the close of the year.

62. Summerhill borough, Cambria County, is supplied with water from Laurel Run. Thirty-seven properties on the watershed were inspected, and all but seven were found to be in a satisfactory condition. Twenty-one pollutions upon seven unsatisfactory properties were removed, leaving all the properties on the watershed in a satisfactory condition at the close of the year.

63. Susquehanna borough, Susquehanna County, is supplied with water from Conewacta and Dreaker's Creeks. Forty-eight properties on the watershed were inspected, and all but seven were found to be in a satisfactory condition. Eight pollutions upon four unsatisfactory properties were removed, leaving three unsatisfactory properties unchanged at the close of the year.

64. Tremont borough, Schuylkill County, is supplied with water by the Tremont Water and Gas Company from Poplar and Hollenbach Runs. Both watersheds are reported to be uninhabited.

65. Trumbauersville borough, Bucks County, does not have a public water works system, private wells being used as the only source of supply.

67. Uniondale borough, Susquehanna County, does not have a public water works system, private wells and springs being used as the only source of supply.

68. Wyalusing borough, Bradford County, is supplied with water from Wyalusing Creek. Thirty-three properties upon the watershed were inspected, and all but six were found to be in a satisfactory condition. The six unsatisfactory properties remained unchanged at the close of the year.

69. Yardley borough, Bucks County, is supplied with water by the Yardley Water and Power Company. The source of supply is reported to be a drilled well.

The twelve villages whose watersheds were inspected are as follows:

1. Annville village, Lebanon County, is supplied with water by the Annville Water Company from three springs and two drilled wells in North Annville township. There is an emergency supply from springs located in South Annville township. The supply is reported to be in a satisfactory condition.

2. Burnham village, Mifflin County, is supplied with water by the Lewistown and Reedsville Water Company from Treaster Run. Four occupied estates on this watershed were inspected and all but one found to be in a satisfactory condition. The one unsatisfactory property remained unchanged at the close of the year.

3. Fredericksburg village, Lebanon County, is supplied with water by the Fredericksburg Water Company from an artesian well, reported to be in a satisfactory condition.

4. Keating Summit village, Potter County, is supplied with water by the Emporium Lumber Company from springs and an artesian well, which are reported to be in a satisfactory condition.

5. Milroy village, Mifflin County, is supplied with water by the Lewistown and Reedsville Water Company from Laurel Run. The one occupied estate upon the watershed is reported to be in a satisfactory condition.

6. Naginey village, Mifflin County, is supplied with water by the Lewistown and Reedsville Water Company from Treaster Run. Four properties on the watershed were inspected and all but one was found to be in a satisfactory condition, remaining unchanged at the close of the year.

7. Palmyra village, Lebanon County, is supplied with water by the Londonderry Water Company from springs and drilled wells, and a spring run, the watershed of which is uninhabited.

8. Rauchtown village, Clinton County, is supplied with water from Nippenose Creek. Three unsatisfactory properties were found on the watershed, remaining unchanged at the close of the year.

9. Reedsville village, Mifflin County, is supplied with water by the Lewistown and Reedsville Water Company from Cooper's Gap and Laurel Runs. One occupied estate was found upon each watershed and both are reported to be in a satisfactory condition.

10. Roulette village, Potter County, is supplied with water by the Roulette Water Company from a drilled and dug well and two reservoirs. The watershed of the reservoirs is reported to be uninhabited.

11. Siglersville village, Mifflin County, is supplied with water by the Lewistown and Reedsville Water Company from Treaster Run. Four properties on the watershed were inspected and all but one found in a satitsfactory condition, remaining unchanged at the close of the year.

12. Yeagertown village, Mifflin County, is supplied with water by the Lewistown and Reedsville Water Company from Coopers Gap and Laurel Run. One occupied estate was found upon each watershed, and both are reported to be in a satisfactory condition.

West Lebanon township, Lebanon County, is a township of the first class, and is supplied with water from three drilled wells operated under the direction of the township board of commissioners. This water supply is reported to be in a satisfactory condition.

The Pennsylvania Railroad Company has a water supply on the north branch of the Conemaugh River, in Cambria township, Cambria County, one hundred and seven properties on the watershed were inspected, and all but nine were found to be in a satisfactory condition. Forty-five pollutions upon the nine unsatisfactory properties were removed, leaving all the properties on the watershed in a satisfactory condition outside of Ebensburg borough.

The less particular work on the watershed involved the drainage areas of the following streams:

Streams	Occupied properties on watershed			Abatements.		
	Total.	Satisfactory.	Stream Menaces.	Estates.	Pollutions.	Properties Unchanged.
Wissahickon Creek, Montgomery County,	2,798	2,601	197	33	54	161
Tacony Creek, Montgomery County,	1,216	1,098	118	12	26	106
Conoquessing Creek, Montgomery County,	9	9	0	0	0	0
Darby Creek, Delaware County,	2,840	2,425	415	78	113	337
Chester Creek, Delaware County,	1,811	1,573	238	21	32	217
Cobbs Creek, Delaware County,	1,638	1,409	229	44	89	185
Marcus Hook Creek, Delaware County,	286	216	70	0	0	70
Brandywine Creek, Delaware County,	241	213	28	0	0	28
Naaman's Creek, Delaware County,	151	132	19	2	2	17
Perkiomen Creek, Lehigh, Montgomery and Bucks Counties,	57	0	57	43	107	14
Mahoning Creek, Jackson, Indiana and Armstrong Counties,	2,470	2,229	241	110	174	101
Monocacay Creek, Northampton County,	1,453	1,400	53	0	0	53
Martins Creek, Northampton County,	1,491	1,391	100	5	7	95
Bushkill Creek, Northampton County,	1,274	1,187	87	10	18	77
Ridley Creek, below Media intake, Delaware County,	583	517	66	28	38	38
Crum Creek, below Springfield Water Company intake, Delaware County,	691	541	150	21	40	129
Big Elk Creek, Chester County,	745	653	92	59	136	33
Brandywine Creek, Chester County,	558	390	168	110	242	58
Chester Creek, Chester County,	323	255	68	22	55	46
Christianna Creek, Chester County,	30	25	5	3	5	2
Conestoga Creek, Chester County,	83	80	3	2	3	1
Darby Creek, Chester County,	686	657	29	22	27	7
East Brandywine Creek, Chester County,	1,640	1,420	220	160	353	60
Little Elk Creek, Chester County,	196	171	25	23	44	2
North East Creek, Chester County,	135	123	12	12	23	0
Octorora Creek, Chester County,	927	849	78	50	95	28
Pequa Creek, Chester County,	115	102	13	9	11	4
Red Clay Creek, Chester County,	732	597	135	86	190	49
Ridley Creek, Chester County,	285	248	37	29	61	8
East Brandywine Creek, Chester County,	2,461	1,929	532	273	672	259
White Clay Creek, Chester County,	1,163	942	221	149	328	72
Briar Creek, Columbia County,	2	0	2	1	1	1
Wissinoming Creek, Philadelphia County,	24	23	1	0	0	1
Harveys Creek, below intake Luzerne County,	98	74	24	0	0	24
Little Darby Creek, above Mill Dam Club, Chester County,	113	106	7	7	13	0
Little Swatara Creek, Berks County,	20	0	20	9	27	11
Swatara Creek, below Middletown intake Dauphin County,	282	277	5	5	15	0
Laurel Run, Huston Township, Clearfield County,	17	2	15	9	36	6
Shrey Hawk Run, Montgomery Township, Indiana County,	6	5	1	1	4	0
Total,	29,950	26,169	3,781	1,478	2,971	2,275

It will be noted that twenty properties on the watersheds of ice supplies were inspected and that fifteen of them contained water pollutions. Seven pollutions were removed upon four estates, leaving eleven unsatisfactory properties at the end of the year.

	Occupied properties on water shed			Abatements.		
	Total.	Satisfactory.	Stream menaces.	Estates.	Pollutions.	Properties unchanged
Albee Ice Supply, St. Marys Borough,	5	3	2	0	0	2
Catholic Sisters Ice Supply, St. Marys Borough,	3	0	3	0	0	3
Foster's Ice Pond, St. Marys Borough,	7	2	5	0	0	5
Snavely Ice Pond, Penn Township Lancaster County,	5	0	5	4	7	1
Total,	20	5	15	4	7	11

19. GENERAL SANITATION.

Some industrial pollutions cannot be classed as sewage pollutions under the law. They may bring about a very unsanitary condition in a natural water course, requiring to be abated on the score of a common nuisance.

Pollution of the ground water supply by sewage from a village or town or any other source is matter for investigation and action by the State Department of Health. The Commissioner of Health is charged with the preservation of the purity of such waters in the interest of public health. All such work done by field officers which has to deal with the disposal of sewage in villages and towns, comes more particularly under the work of municipal sanitation. In many villages and hamlets throughout the State general practices respecting the disposal of household wastes are insanitary and possibly the cause of disease and mortality. These subjects are properly investigated by the Department of Health since there is no other body having jurisdiction in the fifteen hundred townships wherein reside about one-third of the population of the Commonwealth. This class of work is distinct from other field office work and is treated under the head of General Sanitation.

Within the city, borough, village and township the remedy for the various nuisances in the streams, the pollution of public ground water supply, general unsanitary conditions respecting disposal of household wastes and causes of disease and mortality is found quite often to be a public sewerage system. Considerable time must be allowed naturally for discussion of the introduction of such an improvement and for the inauguration of a sewer system. Therefore, it is not reasonable to expect immediate abatement of these thousands of pollutions within the municipalities. However, the sanitary survey forms a basis upon which to make a beginning.

The following tables gives a summary of sanitary surveys on certain watersheds, and a summary of sanitary surveys in certain boroughs, villages and townships.

Summary of Sanitary Survey of Certain Watersheds.

Streams.	Occupied properties on watershed.			Abatements.		
	Total.	Satisfactory.	Stream menaces.	Estates.	Pollutions.	Properties unchanged.
Ohio River, Washington County,	4,636	3,040	1,596	423	1,076	1,173
Ohio River, Allegheny County,	6,130	0	6,130	2,702	8,023	3,428
Allegheny River, Butler and Mercer Counties,	7	0	7	5	11	2
Allegheny River, Potter County,	1,854	1,559	295	274	440	21
Allegheny River, McKean County,	1,559	1,361	198	66	110	132
Allegheny River, Industrial plants, Potter, McKean and Warren Counties,	60	11	49	29	56	20
Clarion River, Jefferson County,	26	0	26	26	27	0
Beaver River, Beaver and Lawrence Counties,	42	0	42	19	98	23
Mahoning River, Lawrence County,	12	0	12	9	33	3
Lehigh River, Lehigh County, Slatington and Catasauqua excepted,	279	0	279	253	570	26
Lehigh River, Northampton County,	2,001	1,838	163	37	74	126
Schuylkill River, Montgomery County,	4,197	3,848	349	43	81	306
Schuylkill River, Delaware County,	367	327	40	3	3	37
Schuylkill River, Berks and Lebanon Counties,	781	0	781	499	1,312	282
Schuylkill River, Chester County,	3,207	2,712	495	426	806	69
Delaware River, Delaware County,	360	306	54	0	0	54
Delaware River, Northampton County,	1,372	1,227	145	10	14	135
Delaware River, Bucks County,	156	0	156	156	303	0
Total,	27,046	16,229	10,817	4,980	13,037	5,837

Summary of Sanitary Survey in Certain Boroughs and Villages and One Township.

Places.	Occupied Properties.			Abatements.		
	Total.	Satisfactory.	Stream menaces.	Estates.	Pollutions.	Properties unchanged.
Ambler Boro. & vicinity, Montgomery County,	570	300	201	0	0	201
Attleboro Borough, Bucks County,	124	123	1	1	2	0
Bath Borough, Northampton County,	7	0	7	6	18	1
Bolling Springs Village, Cumberland County,	225	220	5	5	11	0
Bristol Borough, Bucks County,	280	0	280	0	0	280
Chalfont Borough, Bucks County,	101	95	6	6	7	0
Hulmeville Borough, Bucks County,	133	118	15	15	28	0
Ivyland Borough, Bucks County,	78	78	0	0	0	0
Langhorne Borough, Bucks County,	294	294	0	0	0	0
Langhorne Manor Borough, Bucks County,	44	44	0	0	0	0
Millheim Borough, Center County,	209	197	12	0	0	12
Minersville Borough, Bucks County,	506	474	32	30	52	2
New Berlin Borough, Union County,	10	0	10	5	8	5
New Hope Borough, Bucks County,	312	253	59	56	118	3
Newtown Borough, Bucks County,	488	474	14	14	30	0
Orbisonia Borough, Huntingdon County,	4	0	4	4	4	0
Portage Borough, Cambria County,	528	265	263	0	0	263
Quakertown Borough, Bucks County,	1,045	942	103	0	0	103

Summary of Sanitary Survey in Certain Boroughs and Villages and One Township—Continued.

Places.	Occupied Properties.			Abatements.		
	Total.	Satisfactory.	Stream menaces.	Estates.	Pollutions.	Properties unchanged.
Richlandtown Borough, Bucks County,	157	157	0	0	0	0
Rockhill Borough, Huntingdon County,	7	0	7	4	4	3
Trumbauersville Borough, Bucks County,	166	163	3	3	4	0
Wiconisco Village, Dauphin County,	499	479	20	12	14	8
Yardley Borough, Bucks County,	296	279	17	17	31	0
Croyle Township, Cambria County,	529	268	261	260	671	1
Total,	6,612	5,292	1,320	488	1,002	

V.—EPIDEMICS.

During the year 1910, the Engineering Division under the direction of the Chief Engineer, either in the field or from the office undertook operations at 22 places, relative to investigating the cause of outbreaks of typhoid fever and executed instructions of the Commissioner of Health to obviate the re-occurrence of the disease as far as water supply, sewerage and sanitary conditions were concerned. These places in order of field investigation were as follows:—

Dysentery outbreak at Penn Steel Casting Machine Company, Chester, Delaware County.

Outbreaks of typhoid fever at:

Brookville,
Titusville,
South Fork,
Scottdale,
Dillsburg,
Cokeburg,
Wilkes-Barre,
Nescopeck,
Texas Township, Honesdale,
Pennsylvania Industrial Reformatory at Huntingdon,
Lime Ridge,
Mt. Joy,
Avella,
Glen Rock,
Byrensville,
Coraopolis,
Woodland,
Connellsville,
Falls Creek,
Carmichaels,
Quarryville.

In the following pages a description of the operations are given at each place.

20. DYSENTERY OUTBREAK AT PENN STEEL CASTING AND MACHINE COMPANY, CHESTER, DELAWARE COUNTY.

On January 25th, 1910, a serious outbreak of dysentery among the employees of the Penn Steel Casting & Machine Company, Chester, was reported to the Department. Dr. B. Franklin Royer of the Department, made an investigation of the outbreak. Assistant Engineer C. Howe Cummings made a detailed investigation of the water supply at the works, which at once appeared to be the probable source of infection. Later Dr. Herbert Fox, chief of the Department's laboratories, and Dr. Rucker, also of the Department's laboratories, came to Chester and conducted bacteriological investigations in an endeavor to discover the exact nature of the infection. The reports of Dr. Royer and Dr. Fox cover the medical side of the outbreak. The bacteriological evidence obtained in an investigation of the drinking water supply is particularly interesting.

General Conditions. The plant of the Penn Steel Casting & Machine Company is located not far from the central part of Chester, between Penn and Concord streets and Front street and the Delaware River. The outer end of the plant is on a bulkhead extending several hundred feet into the river. Chester is a city of 38,537 population, in Delaware County, ten miles down stream from the lower end of Philadelphia and 1 miles from the latter city by rail. It is an important manufacturing town. The Chester Water Company furnishes the public water supply, which is pumped from the Delaware River, at a point a little below the Penn Steel Casting & Machine Company, to a gravity, mechanical filter plant on a summit back of the town, whence the supply is distributed by gravity. The town has an extensive, combined sewer system, which is being carefully re-modeled in accordance with comprehensive plans, ordered and approved by this Department having in view the ultimate treatment of the sewage. At present, the river is here grossly polluted, not only with domestic sewage, but with manufactural wastes of all sorts and this pollution is carried up and down the city front by the tide, which has an average rise and fall of five feet.

Dysentery Outbreak. On January 25th it was learned at the works of the Penn Steel Casting & Machine Company, that about 165 men were out because of sickness, from a total number of employes of about 700. The operation of the plant was seriously crippled. The trouble had first been noticed in the first half of the month and had increased. On January 13th the company had the drinking water analyzed and as a result of the analysis the men were provided with other water, carried in, about January 17th, and were warned not to use the drinking water pipe faucets around the works. In addition, to the 165 men out, many were sick but not sufficiently so to quit work. Some of the men were kept home only two or three days, but some for much longer periods, and many gave up their positions and went to other establishments, so that exact figures cannot be given of the duration of the attacks of sickness.

Water Supply. The principal gravity supply main for Chester extends along Edgemont avenue and Welsh street almost to the river front. In Third street parallel to the river front a 12-inch main branches from the Welsh street main and extends southwesterly through the city. There is also a six inch main in Second street. Connecting with the 12-inch main in Third street and the six-inch main in Second street, there is a six-inch pipe in Penn street extending to Front street, and in Front street about 500 feet to a four-inch pipe in Concord avenue which connects into the Second street main. From this loop on Front street the Penn Steel Casting & Machine Company gets its supply. The plant also maintains a fire pump with a ten-inch suction intake in the river at the end of the bulkhead, and a second pump almost constantly in service to furnish an industrial supply around the works. This second pump has an eight-inch suction intake in the river at the end of the bulkhead. The several supplies are interconnected for the sake of fire protection. The bulkhead has an end width in the river of 600 feet. The two suction intakes are about at its center. Three sewers take all of the sewage from the works, both sanitary and industrial, and discharge at the end of the bulkhead near the surface of the water. Two of the sewers are below the water intakes and one above and all three are within 200 feet of the intakes According to the tide the sewage from one or the other sewers is constantly carried directly past the suction pipes, including, at times, hydro-carbon wastes incidental to the operation of the furnaces and the washing of gases and similar work. The course of the highly colored, dark flow from the sewers past the intakes was at times very marked. Thus the water from this source as necessarily grossly polluted a great part of the time.

The connection with the city main on front street is a four-inch pipe. On this connection in order from the street main into the works are the following: a gate valve, open throughout the test described; a meter; one inch connection which furnishes water to the office and to drinking faucets around the works; a fireplug; a check valve and the connection to the industrial and fire protection distributing system extending throughout the plant; the service pump and the emergency fire pump discharging into this distributing system. The service pump ordinarily operates continuously furnishing about 30,000 cubic feet of water per day for industrial purposes. When it is not operating, the supply is derived through the check valve from the city service, although it appears from observations that less water is then used, the pressure of the service being considerably less.

The water samples analyzed January 13th above referred to were taken from a tap on the river water system and a tap on the filtered city water system respectively, in the works and analyzed by Booth, Barrett and Blair:

	Total Bacteria per c. c.		
	48 hrs. at 20° C.	24 hrs. at 37° C.	B. Coli
Filtered City Tap,	905	390	Present
River water tap,	1,290	374	Present

On the same day, Dr. J. R. T. Gray, city bacteriologist, made an analysis of the city water from a tap in his office, the result being 105 total bacteria after 48 hours, and no B. coli. Dr. Woods, the water company's analyst, obtained the following results from samples collected January 21st:

	Bacteria per c. c.	
	Total	B. Coli.
Penn. S. C. & M. Co. (Chipping Shop) river water,	30,000	800
Penn S. C. & M. Co., (Chipping Shop) city water,	980	0
104 Penn St. City Tap,	240	0
101 Penn St. City Tap,	320	0

On the same day, Dr. J. R. T. Gray, city bacteriologist, made an analysis of the city water from a tap in his office, the result being 105 total bacteria after 48 hours, and no B. coli. Dr. Woods, the water company's analyst, obtained the following results from samples collected January 21st:

The last two samples are from connection to the Penn street main at a point which the flow of water in the pipe naturally passes before reaching the connection to the Penn Steel Casting & Machine Company works.

All these tend to show conclusively that the city supply was reasonably safe, but that in the works of the Penn Steel Casting & Machine Company it became polluted from some other source. Moreover, it was learned that on January 16th, 1910, the main gate valve to the Penn Steel Casting & Machine Company had been closed and the fire plug between this valve and the check valve opened, and that a slight leak had continued to flow from the plug, the gage on the pump at the works indicating 90 pounds pressure, more than the city pressure. Just afterwards the meter was opened and cleaned and some leakage was observed to flow into the meter from the direction of the works longer than it seemed fair to attribute to the draining of the pipe system. All these facts point clearly to the water system as possible source of the infection and the fact that the employees come from all over town, and that dysentery was not prevalent throughout the town in a degree at all comparable with its prevalence at the Penn Steel Casting & Machine Company points to the water supply as the probable source of infection. Bottles for taking samples for bacteriological anaylsis were sent for and samples were collected on the 27th of January, and on several days thereafter. The most interesting and conclusive of the results and the manner of taking these samples are described below. The operation of the water works system was placed entirely under Mr. Cumming's direction.

The pressure of the city system outside of the works ranged from about 60 pounds to about 75 pounds as determined from the pump gage in the works when the pump was not operated and from an auxiliary gage used on the fire plug and on taps on the filtered water system in the works. The high pressures occurred at night. The pressure maintained by the pump in the works ranged from about 75 pounds to 100 pounds, the high pressures being obtained at night. All the samples from the filtered water system in the Penn Steel Casting & Machine Company's works were collected from the faucet in the chipping room reached first from the office. It was estimated that with this faucet turned on to a certain point it would require two or three minutes' flow to flush out the pipe system between this point and the meter on the four inch connection from the street and the samples were taken in series at intervals so as to get water before the pipe would be flushed out and afterwards. Most of the samples were taken at night because there was no other draft upon the filtered water system in the plant than that made in taking the samples, so that this draft could be checked up by the meter readings, which corresponded closely with the estimated flow. The following samples were of course all analyzed at the State Department of Health laboratories and were taken while the service pump in the Penn Steel Casting & Machine Company's works was maintaining a back pressure against the check valve.

	Bacteria per c. c.		
	Time of collection.	Total.	B. Coli.
Samples collected evening of January 27th.			
104 Penn St., City tap,	8.58	100	0
Chipping Shop (filtered) water turned on at,	9.17		
Sample taken at,	9.17½	1,200	13
Sample taken at,	9.18	600	0
Sample taken at,	9.22	240	0
Samples collected evening of January 28th.			
101 Penn St., (city tap),	7.17	120	0
Filtered water in chipping shop and filtered water in No. 1 foundry ran several minutes to flush pipes about,	7.30		
101 Penn St (city tap),	8.44	38	0
Chipping shops (filtered) water turned on at,	8.53		
Sample taken at	8.53½	980	10
Sample taken at	8.54	300	0
Sample taken at	8.55	190	0
Sample taken at	8.59	14	0
Raw river water from Penn Steel C. & Machine Co., pump,	9.16	950	37
101 Penn St. (city tap),	10.12	18	0
Chipping Shop (filtered) water turned on at,	10.21		
Sample taken at	10.21½	6,000	33
Sample taken at	10.22	9,000	0
Sample taken at	10.23	340	0
Sample taken at	10.27	82	0

The foregoing results show very clearly the fact that the filtered water supply was polluted after passing into the pipes of the Penn Steel Casting & Machine Company. The results of the samples from the houses on Penn street outside of the connection with the works furnish a check on the character of the city water. It will be noted that in each series of tests of the filtered water from the chipping shop, the first samples collected showed the presence of the grossly polluted water which had been forced past the check valve and mixed with the water from the city supply. However, after the water had run several minutes from the faucet so as to flush out the pipe system, the samples collected showed that the water was then nearly as pure as the water from the city pipes, indicating that the leak passing the check valve, at least at these times, was inconsiderable, since it failed to influence noticeably the character of the city water. Nevertheless, the first sample in the last series taken in the evening of January 28th at 10:21 P. M. shows pollution as gross as the raw river water, while the sample collected from the same faucet only an hour and twenty minutes before, after the pipes had been flushed shows only 14 bacteria per c. c. and no B. coli, a result favorably comparable with any obtained from analysis of the filtered city water. No chemical tests were made by the Department of the water from the Penn Steel Casting & Machine Company but the hydro-carbon wastes observed to flow directly past the intakes must necessarily have been introduced into the drinking water system together with the bacterial pollution. Either these wastes or the gross sewage bacteria pollution was undoubtedly the cause of the outbreak of dysentery. Perhaps both factors may have been influential. The studies by the Department's doctors led to the conclusion that the sewage bacteria pollution was the most influential. Of course during all this time drinking water from outside was being furnished the employees of the Penn Steel Casting & Machine Company.

The question naturally arises, did any polluted water find its way past the meter and out into the city system. If any did, the quantity was probably very small judging from the short time which it required for the drinking water pipe system of the Penn Steel Casting & Machine Company to be flushed out and from the very slight traces only of pollution in this water after the flushing. This flow from the filtered water faucet necessarily contained all the leakage of polluted water passing the check valve at the time, and this flow was through a one inch pipe, whereas the street main is a six inch pipe. Moreover, dysentery was not prevalent at this time in the district along the the pipe lines just beyond the Penn Steel Casting & Machine Company. A few cases appeared to be scattered over the town, quite as many in the water districts above as in those below the Penn Steel Casting & Machine Company.

Sunday, January 30th, the check valve was opened and repaired, not in the presence of any representative of the Department.

On February 2nd and again on February 7th, 1910, tests similar to those already described were made and in addition quite a number of samples were collected from taps in several houses connected with the city pipe below the connection of the Penn Steel Casting & Machine Company as well as from houses connected above it as in the previous tests. The results of these anaylses indicate that the leak had been stopped. The highest count obtained in any filtered water sample either from the Penn Steel Casting & Machine Company or from the taps outside, was, total bacteria 7 and B. Coli 0 per c. c. on February 2nd and total bacteria 28, B. Coli 0 per c. c. on February 7th. A sample collected from the raw river water pump at the Penn Steel Casting & Machine Company on February 7th showed 1,000 total bacteria and 13 B. Coli per c. c. By this time many of the men out of the Penn Steel Casting & Machine Company had returned to work and conditions were becoming normal.

Conclusions. This outbreak of a water-borne disease serves to illustrate the great danger incident to maintaining a check valve between a polluted industrial and a drinking water supply, and the necessity for water-works authorities to make careful and systematic inspections of and rigorous regulations regarding the use of such valves. The protection of human life and health is surely more important than the protection of a property from fire and, moreover, the double fire protection might be obtained by a complete separate system of pipes, the expenditure for which would certainly be justified in order to avoid the occurrence of such outbreaks as the foregoing, which might have had much more serious results.

21. TYPHOID FEVER AT BROOKVILLE.

In February a petition was received from several leading citizens of the town of Brookville stating that typhoid fever was prevalent and that its origin was thought to be the public water supply and requesting that the State Department of Health investigate existing conditions to prevent an epidemic. Mr. Ralph E. Irwin, assistant engineer, was instructed to make an investigation, apply germicidal treatment to the water, make a canvass of the cases and report. There were a total of 15 cases of typhoid fever. The water supply was considered suspicious. The Commissioner of Health ordered the water company to install a filtration plant and before the close of the year plans for a filtration plant had been submitted and approved by the Commissioner of Health. The following is a report of the operations:

Brookville is a community of about 2,700 population and the county seat of Jefferson County. The built-up section is extended beyond the borough limits into Rose township. The town is located at the forks of two streams which unite to form the Red Bank Creek these two tributaries unite in the borough; the one coming from the north is called North Fork and the other is known as Sandy Lick. Both drain considerable areas, but the watershed of the former is sparsely populated, while that of Sandy Lick contains several boroughs and a number of active coal mining operations.

North Fork Creek rises in the northern part of Polk township, flows south and receives the south branch of the North Fork as it enters Warsaw township. During its course through Warsaw township it flows west nearly touching Eldred township and receives Craft Run and Shippen Run as tributaries from Eldred township. Then it takes a southerly direction until near the southern boundary of Warsaw township when it flows southwest leaving Warsaw township and forming the boundary between the southeast corner of Eldred township and Pine Creek township. As it crosses the corner of Eldred township it receives Red Lick Run as a tributary from Eldred township. On leaving Eldred township it forms the eastern and western boundary line between Rose township and Pine Creek township until reaching Brookville borough. The stream enters Brookville at the northeast corner, receives a small tributary a short distance within the borough limits and flows south a little over half of the northern and southern dimensions of the borough and then it unites with Sandy Lick Creek to form Red Bank Creek.

Sandy Lick Creek rises in the northwestern corner of Clearfield County about fifteen miles from the boundary line between Clearfield and Jefferson counties. It flows west touching Washington township and then enters the northeastern corner of Winslow township. During its course through this township it receives numerous tributaries, the principal of which is Soldier Run, which drains the greater part of the township. Shortly after Sandy Lick enters Winslow township it takes a western direction until reaching the north central part when it takes a southern course passing between Reynoldsville borough and West Reynoldsville borough. As and forming the whole of the boundary between Pine Creek and Knox townships. When near the western boundary of Pine Creek township it makes an abrupt turn towards the north, forming a horse-shoe curve within Pine Creek township, but still remaining the boundary line between the townships. As it makes this curve it receives Mill Creek as a tributary from Pine Creek township. Mill Creek also drains part of Snyder, Warsaw and Washington townships. Upon leaving Pine Creek township the stream becomes the southern boundary of Brookville borough until the southwestern corner is reached, when another abrupt bend is made, the stream flowing to the northeast and then directly north uniting with North Fork Creek. North Fork Creek and Sandy Lick Creek unite to form Red Bank Creek. Red Bank Creek flows a short distance to the west and then leaves the borough and slowly bends towards the south. Soon again it takes a southwesterly direction toward the central part of the county.

At the junction of North Fork and Sandy Lick there are three hills. One between the North Fork and Red Bank Creek; second, between Sandy Lick and Red Bank Creek and third, to the east of the North Fork and Sandy Lick. The hills are precipitous and afford but little land along the river edge. The highest of the three hills is that between the North Fork and Red Bank Creeks and has an elevation of about four hundred feet above the creeks. It is on these three hills that Brookville borough is located. The business section and many residences are situated on the hill bounded on the east by North Fork and on the south by Red Bank. The other two hills are well populated. The borough has an incorporated area of ten hundred and fifteen acres. This has not changed since 1868 when the eastern addition of three hundred and seventy and five-tenths acres was annexed. The population of the borough in 1880 was 2,136, in 1890, 2,478; and in 1900, 2, 472, and the estimated population in 1910 is 3,000. The built-up section of each hill has extended beyond the borough limits, so that as a whole, there are about as many inhabitants immediately outside the borough as there are within. Thus the estimated population of 3,000 reaches nearly 6,000 when the town as a whole is considered. The borough presents a thriving appearance and is increasing slowly in population.

A public sewer system was installed in 1885 and 1886 and it is estimated that about 1,300 of those residing within the borough limits are connected with this sewer system. There is one sewer outlet into North Fork Creek below the mill dam from which the public water supply is obtained. Two short lines of sewers enter Sandy Lick Creek. The principal part of the sewage enters Red Bank Creek through six sewer outlets. Extensions to the sewer system have been made from time to time as the borough deemed necessary. No permit has ever been obtained for the extnsions made.

After the typhoid fever outbreak in February the following communication was sent to the water company, ordering the plans for a filter plant to be made.

"May 23rd, 1910.

"Brookville Water Company,
"Brookville, Jefferson County, Pa.

"Gentlemen:

"In February of the present year a typhoid fever epidemic broke out in Brookville and the State Department of Health was called in to make an investigation and to help the spread of the infection. Prior to that time officers of the Department had made an inspection of the entire watershed above the intake of the Brookville Water Company, on North Fork Creek and had issued orders for the abatement of all nuisances and stream pollutions. This the Department did of its own initiative. It is the duty, however, of the water company, in conformity with its charter requirements, to furnish a pure and wholesome supply to the public at all times.

"We have been supervising the introduction of a solution of copper sulphate into the tanks of your company in order to safeguard the public health and this has been going on for a number of weeks. The State will now discontinue this work but your company is hereby notified that it should continue this treatment of the water under the direction and supervision of the local health authorities.

"I hereby notify the Brookville Water Company that it is not fulfilling its charter obligations and that it must proceed to prepare plans for the installation of a water purification plant and submit said plans to the Commissioner of Health for approval on or before August 1st, 1910. Failure on the part of the water company to do this will compel the Department to place the matter in the hands of the Attorney General for action. These plans should include the existing water works system.

"Furthermore, you are requested to explain the violations of the provisions of Act 182 of 1905, by the water company in that it has extended its water works system by building distributing tanks and pipe line without making application to and receiving approval of the State Commissioner of Health as required by said act herein before mentioned. It is clearly the duty of a corporation brought into existence by the laws of the State to be keen in its observance of all requirements, and especially those affecting its charter obligations. The power which brings a water company into existence should be exercised to deprive the company of its corporate existence where said company neglects and refuses and wilfully evades the requirements of its charter and the provisions of State law relative thereto.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

The water company has since complied with the order and plans of the existing water works and for the installation of a new water filter have been prepared and are herein considered.

There are a number of inhabitants who obtain their drinking water from springs outcropping on the hillsides. In some cases several families unite to take water into their residences from these springs. The Commercial Hotel, American Hotel, and Court House secure a partial supply in this way. Each one of these hotels has an individual spring. However, the pressure is low in the buildings and so a connection is made to the public supply. It is impossible, because of the frequent interchange of these two waters, to tell what part of the building or hotel is supplied with either the public water or the spring water.

The Brookville Water Company was incorporated August 8th, 1883 for the purpose of supplying water for domestic and all other purposes for which the same way may be demanded or required by the public to the public in the borough of Brookville and vicinity, Jefferson county.

The system of water works now in use comprises an intake on the North Fork Creek, a pumping station, water works and distributing system.

The pumping station is located on the western side of North Fork Creek about five hundred feet north of the breast of the mill dam. The building is of brick construction about 50 feet in length and 30 feet in width. The Mill dam is located on North Fork Creek about 1500 feet above its junction with Sandy Lick Creek. The mill for which this dam supplied power has been dismantled and moved away. The mill dam at the present time is filled with logs and a great amount of decaying vegetable matter, so that the water became colored during a period of drought during the summer. On the western side of this mill dam about 500 feet from the breast of the dam is located the pumping station of the Brookville Water Company. This station was built at the time the water company was chartered in 1893. The station is euipped with two boilers, one 35 horse power and one 45 horse power to furnish power for a Worthington duplex horizontal pump which has a capacity of about one million gallons per 24 hours. This estimate is based upon the fact that these pumps deliver to the storage tanks about 600,000 gallons in eleven hours. The pumping station is also equipped with a Seneca Falls Triplex pump of one million gallons capacity. This pump is driven by a 50 horse power Springfield gas engine. This pump and gas engine were installed in 1902. From each of these pumps an eight inch suction line extends to the intake located in a crib about 264 feet east of the station. The crib is located in that part of the mill dam containing the greatest depth of water and where there is greatest probability of a current. A 7 inch discharge pipe leaves each pump and unites within the station to form a single 7 inch discharge pipe. It is said that a short distance outside of the building this 7 inch discharge reduces to a 6 inch pipe, and contiues as a 6 inch pipe to the storage tanks on the hilltop. A dial attached to the discharge main in the pumping station registered 130 pounds pressure and an elevation of 300 feet.

The discharge line from the pumping station to the storage tanks is said to be approximately 1683 feet in length. The storage tanks are four in number located on Barnett Street at the highest point on the hill and are throughout of steel construction, 25 inches in diameter and 22.5 feet in height, holding approximately 150,000 gallons each. When the water works were first installed wooden tanks were used. These were replaced by the steel tanks, the dates of construction being as follows: 1892, 1894, 1898 and 1899. All four tanks are within a securely closed frame building. The discharge main enters this building on the western side, rises above the tanks and passes between them so that two are on either side of the discharge main. From this central main a branch leads to each tank. Each inividual tank has no other foundation than the natural formation of the hill. Within a few inches of the bottom is a manhole which gives access at time of cleaning. The outlet is said to be 8 inch pipe located in the side of the bottom. The bottom of the tank is also equipped with a three inch flush pipe. The gate of the flush pipe is immediately outside of the tank and is connected to a six inch terra cotta sewer line that empties into an open gutter in Barnet Street a short distance from the tank building. It is said that the tanks are flushed twice each year. The tanks are well protected and kept in excellent condition.

The 8 inch outlets from the individual tanks are united soon after leaving the tanks. Gates are so placed on these outlets that any one of the tanks may be closed so that water is shut off from the distributing system. The superintendent of the water company states that there are over 9 mile of water mains throughout the borough and outlying districts. As the water company has not up to the present submitted any plan of the distributing system it is impossible to tell where the 9 miles of distributing mains are located. The superintendent declares that the company has no plans of its pipe lines. He states, however, that extensions have been made during 1906, 1907, 1908 and 1909 of a total amount of 9625 feet. There are about 600 service taps. He also states that the whole of the supply is used for domestic purposes except the small amount that is used by the public for fire protection. The distributing system has been extended beyond the borough limits and is, therefore, beyond the chartered area of the water company. The superintendent stated that two of the extensions to the mains beyond the borough limits were in the Carrier Addition and along the Troy Road passing the Osborne Addition.

The Carrier Addition is located adjacent to Red Bank Creek on the hill bounded by the Red Bank and Sandy Lick Creeks. It is stated that in this addition water is supplied to the Catholic Church and School and a number of residences.

On the Troy Road as it passes the Osborne Addition the public line extends beyond the borough limits and supplies water to several residences in the district.

The daily consumption during the winter season is probably between 600,000 and 700,000 gallons. As the storage tanks hold approximately 600,000 gallons it necessitates the pumping of the water from North Fork a considerable time each day. Because of this there can be no choice as to the quality of water afforded by the creek. The pumps are started about 5 o'clock in the morning to supply water during the heavy consumption, during the forenoon, and generally have the tanks filled from 3 to 5 o'clock in the afternoon. The period of sedimentation is short and as the outlet of the distributing main is located in the bottom of the tanks the water receives no sedimentation whatever the sediment being carried directly to the distributing system. In tracing the course of the North Fork from its source in Polk township it is readily seen that a large territory is drained. Throughout the whole watershed of the North Fork Creek the land is rugged and at times of heavy rains and sudden thawing of snow large bodies of water are carried down the North Fork to Red Bank Creek. An inspection of the North Fork shed was completed by a Department officer during the latter part of 1909. From the inspection blanks it was found that 1753 persons were living on the North Fork watershed. It is safe to say that the greater part of this population is in close proximity to the North Fork and its tributaries. It is also learned from these inspection blanks that typhoid fever is constantly present each year on this watershed. The following table will show the results of the data collected regarding typhoid fever:

Year	Cases.
1902	2
1903	3
1904	4
1905	3
1906	10
1907	3
1908	16
1909	5

It is known that in a number of cases the fever patients were not properly cared for and that infectious matter entered the streams. Many of the inhabitants of the watershed are woodsmen ignorant of any sanitary regulations and so located that proper protection cannot be given to the untreated water supply.

The borough of Brookville has for years had a very active local Board of Health, Mr. C. P. O'Laughlin has been acting secretary since the formation of the board. At present Dr. W. L. Snyder is the local Health Officer. The Board of Health has done much to protect the citizens from the danger existing on the watershed and have at times hired men to remove pollutions that were greatly endangering the water supply. It is probably due to the active interest taken by this local organization that the borough has never had an extensive typhoid outbreak. The secretary gives the following typhoid fever statistics:

1898	11
1899	5
1900	5
1901	3
1902	8
1903	8
1904	6
1905	12
1906	7
1907	14
1908	8
1909	7

TYPHOID FEVER OUTBREAK.

The typhoid fever rate is not high but it has generally appeared in sudden outbreaks showing that there must be a local cause. The water company and the people as a whole admit that the water supply to the borough is dangerous and that some means should be provided whereby better protection be given the citizens.

On February 24th, 1910, a petition was received from several of the leading citizens of Brookville the number including the County Superintendent of Schools, two physicians and three attorneys-at-law. The petition stated that at that time typhoid fever was prevalent and it was thought to originate in the drinking water furnished to the citizens by the water company and that it was desired that the Department of Health should investigate existing conditions before an epidemic reached the borough.

On February 25th, 1910 Mr. Irwin with assistant engineers and field officers visited Brookville and made a field investigation of the water supply and typhoid fever cases then existing in the borough. It was found that between January 29th, 1910 and February 22nd, 1910 there were 15 cases of fever. The cases were widely scattered about the borough and in every instance but one, sanitary conditions of the property in which the fever patients were located were excellent. In all but two cases city water had been in use. The case of J. A. Edwards cannot be charged to the borough as Mr. Edwards returned from Virginia February 21st, and was at that time suffering with typhoid fever. All of these patients were treated at home as the borough has no hospital. Five were cared for by trained nurses. In every case those in charge of the patient were instructed regarding the care of the patient and the proper disinfection. Also special attention was called to the milk supply.

The following table is inserted to show part of the data collected concerning each case.

No.	Age.	Date of Onset.	Trained Nurses.	Sanitary Conditions.	Physician.	Water Supply.	Milk Supply.
		1910.					
1	61	Jan. 29	Yes	Good	W. L. Snyder,	City	W. H. McHinch.
2	20	Feb. 3	No	Good	W. L. Snyder,	City	J. F. Procious.
3	27	Feb. 3	Yes	Good	W. L. Snyder,	City	F. M. Hayes.
4	10	Feb. 4	Yes	Good	W. L. Snyder,	City	Own.
5	16	Feb. 4	No	Good	Dr. Haven,	City School	J. F. Procious. F. M. Hayes.
6	46	Feb. 4	No	Good	Dr. Balmer,	City	Jas. Campbell.
7	16	Feb. 4	No	Good	Dr. J. K. Brown,	City School	J. F. Procious.
8	16	Feb. 5	No	Good	Dr. J. K. Brown,	City School	J. F. Procious.
9	2	Feb. 9	Yes	Good	Dr. W. L. Snyder,	City	Wm. McGrady. F. M. Hayes.
10	5	Feb. 14	Yes	Good	Dr. W. L. Snyder,	City	F. M. Hayes.
11	17	Feb. 18	No	Fair	Dr. W. L. Snyder,	Spring	Jas. Campbell.
12	6	Feb. 18	No	Bad	Dr. Balmer.	Well	Wm. McGrady.
13	12	Feb. 20	No	Good	Dr. J. K. Brown,	City	J. N. Kelly.
14	17*	Feb. 22	No	Good	Dr. W. L. Snyder,	Well	J. N. Kelley. Jas. Campbell.
15	9	Feb. 22	No	Good	Dr. W. L. Snyder	Well School	J. F. Procious.

*Months.

MILLK SUPPLY. It was found that these fifteen fever patients obtained their milk supply from 7 sources as shown in the foregoing table. The borough obtains its milk supply principally from 4 dairymen. However a number of citizens about the borough keep from one to four cows and supply those in the immediate neighborhood with small amounts of milk.

Mr. J. F. Procious is the principal dairyman in Brookville. His dairy is located in Rose township about 2 miles from the borough. The milk supply is from 40 cows on his own farm and 8 cows at the farm of Mr. Diener. The dairy is equipped with almost every modern improvement and is kept in the best of conditions. He has over 250 customers and in this number is included the large consumers in the borough. Mr. Procious supplied 4 of the fever patients with the whole of their milk supply and two with a part of their supply. Full instructions were given concerning the handling of the milk during the typhoid fever epidemic but it was found that already Mr. Procious had taken these precautions and as soon as the house was placarded he at once notified the customer that he could no longer supply them with milk unless they furnished their own containers in which to receive the milk and to place such containers where the milk could be readily emptied into them without handling.

Mr. James Campbell living about one and one-half miles south of the borough keeps a modern dairy but not of the high class as that kept by Mr. Procious. He obtained his milk from 14 cows all kept on his own farm. He was given instructions regarding the handling of milk on typhoid premises and it was found he adhered strictly to the rules. Mr. Campbell had 109 customers and furnished either all or a part of the milk to 3 of the fever patients within the borough.

Mr. F. M. Hays has his dairy a short distance to the northwest of the borough line. There is no separate milk room. Public water is used at the house and barn. Mr. Hayes stated that his dairy had never been inspected by State Inspectors. He furnishes milk to about 75 customers and obtains his supply from 13 cows which are all kept on his own farm. He furnished the whole or part of the supply to four of the fever patients in the borough and after being instructed regarding the care required when delivering milk to fever properties, he strictly obeyed regulations.

Mr. W. H. McHinch, Mr. Wm. McGrady and Mr. J. N. Kelley furnished a part or whole of the supply for one or two of the fever patients. These men were keepers of from one to four cows and had from 4 to 30 customers each. Their properties were inspected and the men instructed regarding the handling of the milk. The properties were in good condition and the milk well cared for.

Besides these milk dealers furnishing milk to the fever patients there were a number of other dealers keeping a small number of cows and furnishing milk in the immediate neighborhood. These properties were also inspected and instructions were given regarding the care of the milk.

The names of the customers of all the milk dealers were obtained so that when fever occurred it could be readily noted who was supplying the milk and how long the supply had been in use. There had been no sickness in any of the families having the care of the dairies.

ICE SUPPLY. The total ice supply for the borough was obtained from the mill pond from which the borough obtained the public water supply. Mr. C. A. Moore was the contractor for taking the entire supply of ice off the dam. Mr. Moore stored 550 tons of retail trade in the summer. He had about 85 regular customers and about 150 transients. He furnished directly from the pond a total of 625 tons to the American and Commercial hotels. This ice was stored in the respective ice houses at the hotels. Twenty-five tons were furnishing for cooling purposes to each of the following parties owning meat markets: C. B. Wetzel, G. A. Snail and Messrs. Dunham & Arnold, Dr. Gorley receiving a like amount for use on his farm. The ice was harvested December 21, 1909 and about January 14th, 1910. A number of samples of ice have been taken and sent to the laboratories for bacteriological analyses. The results of the analyses did not show in any case the presence of sewage organisms. During years when it is impossible to harvest ice from the mill pond artificial ice is obtained from brewery concerns in the borough and sold to the people in the borough by Mr. Moore. The two firms that manufacture ice are the Brookville Brewery Company and the M. Algier Brewing Company. The Algier concern has about 150 private customers besides a few small hotels and butcher shops. The two breweries report that they distill the water before freezing.

WATER SUPPLY TO FEVER PATIENTS. All but two of the fever patients obtained the whole or part of their supply from the public water system. In 4 cases of school children water was obtained at home and at the school house. The supply at the school house was partially from a well and partly from the public supply. In the case of John A. Edwards and Miss May Colphipp no borough water had been used. Mr. Edwards returned from Virginia with a pronounced case of typhoid fever and May Colphipp having never been away from home where public water could be obtained.

A number of samples were collected from the public supply and samples of raw water as it entered the tanks after it had settled in the tanks and also a number of samples from tapes about the borough in the localities of the various fever patients. The results of these tests showed that the creek water contained sewage organisms. Because of the known contamination from the properties of typhoid cases on the watershed the Department required the water company to procure copper sulphate and the water was treated with the copper sulphate by the Department's agents, one part of copper sulphate per million. From the results of the samples obtained after the use of the copper sulphate it was found that no sewage organisms showed in the treated water. Fever cases throughout the borough were of a mild character and were evidently due to some mild infection. From circumstantial evidence it was thought that the public water supply has been the cause of these fever cases. No other cause can be given. The borough has had altogether too much fever in the last number of years. A town so located and having modern improvements should have a less amount of fever. It is deemed by citizens interested in the water question that whether or not the public water supply is at fault there is continual danger of a sudden and virulent outbreak of fever on account of the character of the water from which the supply is obtained. Also the town is large enough to warrant the installation of a purification plant to remove the turbidity only. The citizens obtain spring water when possible and those using the public water are in constant fear of infection so that many have for a number of years used the public supply for drinking only after it has been boiled. Undoubtedly if the water company would so purify its supply that a safe water can be guaranteed to the customers, the increase in the consumption would defray the cost of the necessary improvements.

Improvements by the Water Company.

Carrying out the orders of the Commissioner of Health at the close of the year the water company proposed to abandon its existing intake and pumping station and to erect a new pumping station and dam across the stream about a half mile above the existing dam. The new site is immediately above two runs which drain portions of the borough and are thought to be sources of pollution to the creek. The new site is within the borough but near the Rose township line. It is proposed to build a concrete dam one hundred feet long, with side walls located on either bank and back of these side walls is to be built an earth dam. The top of the concrete dam is to be 9 feet above the bed of the stream. The structure is to be carried down to solid rock and the design is such that in the future, if desirable, an additional four feet may be built on to the top. The embankment to the east of the concrete dam will be short, less than 100 feet, but the embankment to the west will extend across the valley, 250 feet in length, to the foot of the side hills and this embankment will be elevated 14 feet above the top of the concrete dam. At the foot of the slope of the dam a portion of the apron is to be made of concrete and footing this is to be an apron of broken stone. Level with the apron are to be two 36 inch drainage pipes extending from the inner face of the dam with a free vent at the toe of the apron. These pipes are provided for the drainage of the pool and they are to be fitted with sluice gates. From the west wing wall and at the dam in the pool is to be an opening into a screen chamber, entitled on the plan "Settling Basin," and in this chamber, which is to be 12 feet by 16 feet, interior dimensions, are to be set up screens of approved design for the interception of leaves and such floating material. The walls of this chamber will be carried up to the level of the masonry wing wall. These walls will support flooring and possibly a superstructure. Calculations have been made that the 100 foot length of the dam will be sufficient to deliver any flood waters that may come from the watershed of 92 square miles.

From the screen chamber there is to be a 12 inch cast iron pipe extending to the pumping station nearby. This screen chamber will also act as a pump well, the bottom of the chamber being level with the bed of the stream. In case of complete drainage of the pool there will be no water in the pump well.

The pumping station and filter house are to be located near the dam and down stream from the embankment and along the west bank of the creek on land purchased and owned by the water company. The superstructure is to be built of brick, and in the engine room is to be set up the old Gould triplex pump now in use at the station and a new pumping engine is to be provided of the same capacity which is 5000 gallons a minute, or three-fourths of a million gallons each 24 hours. The pumps are to be driven by gas engines, the natural gas of the region being used for fuel.

The filtration plant will consist of a coagulating basin holding 154,000 gallons, equivalent to four hours sedimentation, when operated at the rate of 1,000,000 per 24 hours. There will be installed two rectangular concrete filters 12 feet in width by 15 feet in length, each capable of delivering 500,000 gallons per 24 hours. The filter units will be provided with air and water manifolds, wash troughs, loss of head gages, effluent rate controllers, etc. Immediately underneath the filters will be located a filtered water basin holding approximately 26,000 gallons. Provision is made for applying sulphate of alumina as a coagulant, soda ash for artificial alkalinity, when needed; also for the application of hypo-chlorite should its use be found necessary. The chemical will be added at the influent chamber to the coagulating basin, which shall be so arranged that the basin may be cut out for cleaning purposes and the chemically treated water allowed to flow directly to the filter units. Provision is made in the plans for adding a third filter unit when the consumption of water is increased to an extent to justify its installation.

Detail plans and specifications of the purification plant will be submitted for approval prior to the awarding of the contract.

It is the intention of the water company to proceed at once during the present session of low flow in the creek to construct the dam. The new pumping station and filter plant will be erected this year and be ready for operation at the close of the season.

From the new station a 10 inch force main is to be laid down stream to and will connect with the existing force main which extends to the tanks on the hill.

The pump well should be made deeper and facilities should be afforded to supply an ample amount of water into the pump well at such times as it may be necessary to drain the pool.

The sluice ways for the drainage pool should be made ample in size to discharge the normal flow of the creek during the dry season. A change in the details as now proposed may be made to advantage. One large passage for drainage would answer and the sluice valves might be of wood to be operated from a platform at the end of the dam at the wing wall. A better plan would be to construct the drainage sluice leading from the pump chamber around the masonry walls to the creek below and this is recommended.

In view of these circumstances the Commissioner of Health determined that the proposed improvements and extensions to the water works system will not be prejudicial to public health and he approved the same and granted a permit therefor on the 11th day of August, 1911, subject to the following conditions and stipulations:

FIRST: The water company may extend distributing pipes in its charter territory as necessity may require. At the close of each season's work plans of the pipes laid during the year shall be prepared and filed in the office of the State Department of Health, together with any other information in connection with the same that may be required, in order that the Commissioner of Health may always be informed as to the extent of the water works system and the public use thereof.

SECOND: The water company shall proceed without delay in the construction and completion of the improvements hereinbefore described and herein approved and the water purification plant shall be ready for use on or before the close of the current year.

THIRD: Before the water purification plant is built the detail plans and specifications of the same shall have been submitted to the Commissioner of Health for approval and they will be modified, amended or approved and a permit issued therefore, under stipulations as are relevant thereto and customary in permits of this character.

FOURTH: If at any time, in the opinion of the State Department of Health the water works system or any part thereof, of the water supplied by the water company to its consumers is prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

22. TYPHOID FEVER AT TITUSVILLE.

Titusville is a city of 8533 inhabitants. It is located on Oil Creek near the head waters. During the first week in April, 1910 on request of the local authorities to the State Department of Health that an investigation be made of a water supply to a district in the city, Mr. R. B. Styer of the Engineering Division was sent to Titusville to investigate this local water works in connection with the typhoid fever outbreak.

In Church Run Valley there is an artificial basin known as the Barnsdall reservoir. It was built by the late Wm. Barnsdall in 1870 which was prior to the erection of the municipal water works system. It is situated on Barnsdall hill in the northern part of the city. It is 40 feet square and 11 feet deep. The walls and bottom are built of rock and are 18 inches thick. The inside of the reservoir was cemented but most of this has fallen off. The ground back of the reservoir rises rapidly to the crest of the hill about 250 feet distant.

The reservoir is fed by two springs, one at the northeast corner of the reservoir and another at the northwest corner. These springs are about 10 feet from the reservoir and are piped about 10 feet into the hill. A two inch pipe delivers the west spring and a four inch pipe delivers the east spring to the reservoir. The outlet pipe extending from the resrvoir is an 8 inch pipe.

About 50 feet from the reservoir and 30 feet above it Franklin street crosses the hill. On this street is the property of Mrs. Sarah Baumgardner. This property is about 100 feet from the reservoir and 35 feet above the spring which feed the reservoir. The privy on this property is six feet deep. About 20 feet from the privy and about six feet below the bottom of the privy is a spring, designated as Baumgardners spring, which issues out of the side of the hill onto Franklin Street. This spring showed B. Coli in one of the samples collected. The west spring of the reservoir is on the same line as this spring and about 25 feet below it. It is almost directly on a line with the privy.

On the west side of the reservoir on the same level as the Baumgardner property are the Boyle, Lewis, Demmill and Roden properties. There are about 100 feet, 120 feet, 140 feet and 200 feet distant rspectively from the reservoir. The top of the reservoir is flat with the ground and while a road gutter on Franklin street carries the drainage below the reservoir it is likely that some of the road drainage would reach the reservoir in heavy rains. The underlying rock on the hill is a shale and leans toward the springs and reservoir.

Had the property above the springs been bought and kept uninhabited it is not likely that the springs would have been contaminated. However, it would seem that they have been. In the latter part of 1898 a number of soldiers returned sick from the Spanish-American war and developed typhoid fever. One of these cases was in the Lewis property and another in the Dimmell property. In January 1899 eleven cases of typhoid fever were reported. Five of these were in one family. All of these cases were in houses supplied by the Barnsdall reservoir. While no analyses of the water were made, the board of health attributed the outbreak to this supply.

When the reservoir was built it supplied about 200 houses. At the time of the outbreak in 1899 there were about 75 services on the system. After this outbreak the city water was placed in most of the houses. Only 14 houses remained connected to the system and most of these also had the city supply installed and used the Barnsdall water for washing purposes on account of the hardness of the city water. However, after a time some of these people again used the water for drinking.

On January 12, 1910, Thomas Downey began feeling ill. He worked at Pioneer, Venango county about six miles south of Titusville and lived on the Baumgardner property immediately above the Barnsdall reservoir. His case was pronounced typhoid fever on January 22nd and he was removed to the hospital. While at home he had been using the privy which was immediately above the reservoir.

In the latter part of January a heavy thaw occurred and thoroughly saturated the ground. During the month of February seven cases of typhoid fever developed in houses connected with the Barnsdall reservoir. Of these, the first two were probably of foreign contraction. From the circumstances it would seem to be conclusive that the Barnsdall reservoir water had been polluted from the Baumgardner property. The reason there were not more cases was probably due to the fact that not many of the people drank the water.

On March 10, 1910 the secretary of the board of health sent a formal nuisance notice to the executors of the Barnsdall estate and on the same day the outlet pipe of the reservoir was broken and the broken pipe cemented so as to prevent water from entering the pipes. The water now runs over the side of the hill to Church Run. The reservoir will not be used again. The springs continue to flow into the reservoir and are of easy access. The springs should be piped so that the people would not have access to them.

The following is a list of the typhoid fever cases in Titusville since 1899 as ascertained from the records of the local board of Health:

1899	19 cases
1900	20 cases
1901	10 cases
1902	10 cases
1903	9 cases
1904	15 cases
1905	17 cases
1906	11 cases
1907	20 cases
1908	15 cases
1909	13 cases

It should be stated that nearly all of these cases were reported from the hospital and were cases brought from the surrounding oil districts, it being stated by the secretary of the board of health that there has been no typhoid in the city for the last five years which had not been traced to foreign causes.

During the first three months of the year 1910 ten cases of fever were reported:

Name	Date of Onset	Cause
Thomas Downey,	Jan. 12	Foreign
Leonard Spiesman,	Feb. 1	Foreign
John Broderick,	Feb. 12	Foreign
Matthew C. Steward,	Feb. 10	
John Moran,	Feb. 13	
Cora Murray,	Feb. 14	
Nellie Lawrence,	Feb. 14	
Nora Lantz,	Feb. 15	
Thomas Peebles,	Feb. 12	Foreign
Alinor Kerr,	Mar. 20	Foreign

From this it is seen that five patients contracted the disease from places outside the city leaving five who contracted the disease in the city. Of these, two procured milk from Kerry, two from the Dairy Depot and one from Harvey. These dairy men supply milk to all parts of the city and it is only reasonable to suppose that the fever would have been spread over the whole city had the milk supply been the cause of the fever. But all of these cases were located in a small district in the northern central part of the city.

The municipal water plant is located in the western part of the city. The surface soil is a clay loam which has an average depth of about five feet. Beneath this is an most impermeable blue clay hardpan which has an average depth of about 10 feet. Beneath this hard pan is a gravel lake which varies in depth from 40 feet to 80 feet.

The water supply is derived from ten artesian wells driven into this gravel lake at a depth varying from 48 feet to 68 feet. The water was originally allowed to flow into large cisterns and was then pumped into the system but now the pumps are connected directly to the pipes extending to the bottom of the wells, making a tight connection between the two, and excluding any surface drainage. The water is pumped directly into the mains, there being no reservoir or standpipe. An automatic steam valve regulates the pumps according to the pressure.

The fact that all the fever was in one section of the city would point to the fact that the city supply was not the cause of the outbreak.

23. TYPHOID FEVER AT SOUTH FORK.

There was a general outbreak of typhoid fever numbering 54 cases, in the borough of South Fork, Cambria county during the months of June and July. The public water supply was suspected and the Commissioner of Health ordered the Chief Engineer of the Department to conduct investigations accordingly. Assistant Engineer, Ralph E. Irwin was detailed to the borough and he examined the water works and general sanitary situation, the public water supply was discontinued and unsanitary conditions about the borough were attended to. The following is a report of the Department's operations:

Typhoid Fever.

The following report obtained from the Bureau of Vital Statistics of the State Department of Health shows that the borough of South Fork has always had considerable typhoid fever. The fever has usually been evenly distributed during the summer months when typhoid fever is more prevalent. However, no year has had an amount equal to half of that occurring in 1910.

Typhoid Fever by Months from November 1905 to December 1910 Inclusive.

	1905.	1906.	1907.	1908.	1909.	1910.
January,	--------	4	0	1	0	1
February,	--------	1	0	0	0	0
March,	--------	0	1	1	0	0
April,	--------	0	1	3	0	0
May,	--------	2	1	4	0	--------
June,	--------	0	--------	1	0	4
July,	--------	0	--------	2	1	33
August,	--------	4	4	5	3	3
September,	--------	8	0	4	4	4
October,	--------	1	8	5	12	5
November,	0	2	0	--------	1	0
December,	3	1	0	0	0	4
Total,	8	23	15	26	21	54

From the above table it will be seen that there was reported to the Bureau of Vital Statistics 4 cases of typhoid fever during December, 1910, 4 occurring in June and 33 in July and three in August. By a house to house canvass in the borough and the built up section of the townships adjacent to the borough it was found hat there were 54 cases during June and July. These 54 cases constituted all that could be included in the general outbreak with the exception of a few secondary cases occurring in August and September. The date of onset for 16 of the 54 cases occurred in June, the remainder in July. Some of these 54 cases were reported from the township and some from the hospitals. Bcause of this the number of cases included in the epidemic is greater than the number reported from the borough. The following table gives the date of onset, sex, age and employment of the 54 cases included in the epidemic.

Total by days.	Date of onset.	Sex.		Age.	Employment.
		Male.	Female.		
1	June 19,		1	12	Pupil.
1	June 21,	1		29	Miner.
1	June 21,	1		21	Driver.
1	June 22,	1		34	Miner.
1	June 25,		1	15	Pupil.
1	June 25,	1		42	Miner.
1	June 25,		1	12	Pupil.
1	June 26,		1	7	Pupil.
1	June 27,	1		19	Pupil.
1	June 27,		1	19	Domestic.
1	June 28,	1		20	Driver.
1	June 28,		1	4	At home.
1	June 29,	1		23	Baker.
1	June 30,	1		16	Pupil.
1	June 30,	1		9	Pupil.
1	June 30,	1		13	Pupil.
1	July 1,	1		19	Laborer.
1	July 1,		1	12	Pupil.
1	July 1,		1	13	Pupil.
1	July 2,		1	13	Pupil.
1	July 3,	1		28	Miner.
1	July 3,	1		27	Driver.
1	July 3,		1	7	Pupil.
1	July 4,	1		23	Miner.
1	July 4,	1		24	Miner.
1	July 5,	1		19	Call boy.
1	July 6,		1	8	Pupil.
1	July 7,	1		25	Blacksmith.
1	July 8,	1		22	Miner.
1	July 9,	1		50	Watchman.
1	July 9,	1		12	Pupil.
1	July 9,		1	15	Pupil.
1	July 10,	1		24	Miner.
1	July 10,	1		38	Miner.
1	July 10,	1		12	Pupil.
1	July 10,		1	12	Pupil.
1	July 11,	1		40	Miner.
1	July 12,	1		11	Pupil.
1	July 12,		1	5	At home.
1	July 12,	1		16	Pupil.
1	July 14,	1		22	Miner.
1	July 14,	1		5	Pupil.
1	July 15,		1	19	Housewife.
1	July 16,	1		21	Miner.
1	July 16,	1		27	Smith.
1	July 17,	1		28	Miner.
1	July 18,		1	13	Pupil.
1	July 18,	1		7	Pupil.
1	July 18,		1	5	At home.
1	July 18,		1	15	Pupil.
1	July 21,		1	22	Miner.
1	July 21,	1		22	Driver.
1	July 21,	1		7	Pupil.
1	July 26,	1		35	Miner.

The following table gives the number of cases according to age and sex.

Age.	Male.	Female.	Total.
0-4,		1	1
5-9,	5	4	9
10-14,	4	7	11
15-19,	5	5	10
20-24,	10	1	11
25-29,	6		6
30-34,	1		1
35-39,	1	1	2
40-44,	2		2
45-49,			
50-over,	1		1
Total,	35	19	54

It will be seen from the above table that 21 or 38.8 per cent. were under 15 years of age, 42 or 77.7 per cent. were under 25 years of age and 3 or 5.5 per cent. were over 40 years. It is evident therefore that the outbreak was almost wholly among those under 25 years and the majority was among school children.

The following table gives the number of patients according to employment:

Pupil,	24
Miner,	15
Driver,	4
Domestic,	1
Children,	3
Baker,	1
Laborer,	1
Call boy,	1
Blacksmith,	2
Watchman,	1
Housekeeper,	1
	54

From this table it is seen that 24 of the cases were pupils and three were children. The other cases were mostly among miners and others employed in and about the mines. Only one house-keeper and one domestic was afflicted.

The cases were not located in any one part of the borough but were scattered in all parts and extended out into the townships surrounding the borough.

WATER SUPPLY OF PATIENTS.

Of the 54 cases investigated all had used water from the public supply. Two had used two different wells and also the public supply. Three had used two different springs and also the public supply. These supplies were investigated. One of the springs is located on a hillside above the built up section of the borough and near a mine entrance. The spring was poorly protected and gave evidence of the entrance of surface drainage.

The spring known as the Gillespie spring showed the evidence of B. Coli when examined at the State Laboratory. When the results were received the local board of health had the spring condemned and filled so that it could no longer be used. The second spring known as the Wm. Richards Spring, showed no B. Coli when examined and as the surrounding conditions were favorable its use was continued. The well on the property of John Burkett supplied water to one typhoid fever patient and the analysis of this supply showed it to contain B. Coli; because of this and the poor location of the well it was permanently closed. The other well used by typhoid fever patients was that known as the Sharpless well. This well showed no pollution when examined. It was thoroughly cleaned, graded and continued in use.

Other individual supplies about the borough were investigated as was shown in that part of the report dealing with the individual water supply. It is thought that the wells and springs in use about the borough had little if any thing to do with the fever outbreak.

MILK SUPPLY. The milk supply for the 54 typhoid fever patients was partly obtained from six milk dealers distributing milk about the borough. Each of these dealers had a milk route and served may customers. The number of fever patients that each dealer supplied was as follows:

Max Karl	29
David I ringle	4
Mike Nissley	3
H. B. Baumgardner	1
Jim Anastsi	1
Harvey Oakes	1
Total	39

Thus the milk dealers furnished 39 of the typhoid fever patients. Eight patients obtained milk from those keeping cows in the neighborhood and selling to one or two neighbors. Two used no milk, three used condensed milk, one obtained milk from an unknown source and one had his own supply.

Max Karl is the only milk dealer supplying a large number of those having typhoid fever. This milk dealer obtains his milk supply from many dairies buying his milk from milk dealers who obtained milk for sale in Pittsburgh and vicinity and sold to Mr. Karl. As the milk supplied to Mr. Karl was not obtained from any special dairy but from the whole of the supply purchased to be shipped to Pittsburgh an attempt was not made to learn whether or not the milk was obtained under sanitary conditions. The dairies of the other five milk dealers were inspected and found to be in a sanitary condition. All of the dealers observed the general precautions in distributing milk at the time of the typhoid fever outbreak. No milk utensils being taken from or left at houses which were placarded.

Work of Local Board of Health.

When many typhoid fever cases made their appearance within the borough a member of the water company called the Department's County Medical Inspector by 'phone and asked that an investigation be made to learn whether or not the public water supply was the cause of the trouble. This message was delivered at the Harrisburg office by the County Medical Inspector and the County Medical Inspector then laid the matter before the local Board of Health which had previously to this time given very little attention to the outbreak that was occurring. As soon as advised as to the seriousness of the seemingly general outbreak of typhoid fever the local Board of Health took steps to prevent the spread of the fever and gladly received instructions from the County Medical Inspector and other State officials who came to the borough.

A district nurse was engaged to visit the various typhoid fever premises, especially those in the poor district and give such instructions and aid as were necessary for the proper care of the patients and the protection from further infection within the household. The Health Officer was careful to see that all typhoid fever premises were properly placarded and assisted the nurse in locating the fever patients and gave warning to those about the borough.

The Health Officer was instructed to secure sufficient quantities of lime to scatter about open gutters and water courses in the locality where fever was prevalent and to use lime plentifully in and about water closets. This was done although at a rather late period. The local Board of Health was slow to act until the County Medical Inspector urged them to action.

Work of Local Water Company.

The South Fork Water Company was represented in active work by its Superintendent and Secretary D. W. Luke. Mr. Luke saw that the water mains were properly flushed and all the dead ends and blow-offs opened. The opening of the dead ends in some instances required considerable labor but this was gladly done by the water company. Also Mr. Luke gladly furnished material for the treatment of the water in the reservoirs and furnished conveyances when it was desired to have samples gathered. The water company at the time was ready and willing to provide all possible protection to its patrons and to conform with any requests or orders received from the State Department.

Cause of the Epidemic.

There is no doubt in the Department's opinion that the infection was received from the public water supply and that the public supply was infected by typhoid fever organisms received on the watershed, and from the E. W. Baumgardner property located in Adams township. The infection was direct and quickly carried to the reservoir and undoubtedly a very serious and severe outbreak would have occurred had it not been for the sedimentation period in the reservoir. This reesrvoir has a capacity of 18 million gallons and as the daily consumption in the borough is about one million gallons, the reservoir probably held 18 days' supply. The inlet to the reservoir is at the farthest point from the outlet and it would be impossible for any infectious matter entering at the inlet to make a short cut to the outlet but would have to follow the regular course of the water through the reservoir and be subjected to a lengthy sedimentation period. It is probable that the infection was still entering the distributing system at the time of the chemical treatment of the reservoir as the cases continued to appear ten or twelve days after the sterilization. It is very probable in this case that a great amount of good was done by the use of the copper sulphate as a sterilizing agent. There is no reason to think that the individual water supplies about the borough or the various milk supplies had any part in the general outbreak. Although the sanitary conditions in some districts of the borough and in parts of the built up sections of the townships were exceedingly bad it is thought that the preventative measures taken by the local Board of Health with the assistance of the Department officers prevented the appearance of many secondary cases. It was thought by some that the outbreak was probably due to the general unsanitary condition and the absence of a good sanitary sewer system. This may have been the cause of a few of the cases and probably was a factor this year as well in previous years when typhoid fever was prevalent during the summer season but there is no reason to attribute the outbreak as a whole to the unsanitary condition of the borough as the outbreak occurred during a very short period and was general in all parts of South Fork.

Public Water Works.

The Commissioner of Health issued the following order to the water company:

"July 25th, 1910.

"The South Fork Water Company,
"South Fork, Cambria County, Pennsylvania,

"Gentlemen:—

"All surface water supplies coming from drainage areas that are inhabited are more or less freighted with sewage poisons. There are numerous safeguards which act as barriers, under ordinary circumstances, to the transmission of this infection to the consumers of the water. This accounts for the reason, possibly, that South Fork has not been previously visited, during the last five years by a typhoid fever epidemic, but there has been more typhoid fever in the town than has been necessary. The present epidemic is believed to be due to the infection of the water supply, and it is concluded that the barriers to a repetition of the transmission of such infection into the homes of the consumers on the watershed are not sufficient to afford reasonable assurance. You are therefore required to immediately employ a competent and skilled expert to design for you plans for the filtration of the water supplied by the South Fork Water Company to the public. You are requested to submit these plans at the earliest date possible to the Commissioner of Health for approval. A prompt reply is requested.

Yours truly,
"(Signed) SAMUEL G. DIXON."

Water is supplied to the public in the borough by the South Fork Water Company, incorporated in 1892 to supply water to the public in the borough of South Fork and certain portions of Croyle Township adjacent to the borough. The present system comprises two reservoirs on Sandy Run with supply main to the borough and distribution system in the streets.

The water works were constructed in 1892 and water obtained from a small reservoir on Croyle Run. Shortly thereafter a similar reservoir was built on Flenner Run in Adams Township. The pipes leading from the Croyle Run source have been disconnected for several years and it is reported that water from Flenner Run has not been used for over two years. The pipes from the latter source were disconnected from the system in July, 1910.

The existing source of supply is Sandy Run, a tributary of the South Fork. This stream is fed by numerous springs in the mountain south of the borough and drains a watershed with steep rocky slopes, largely covered by timber. Sandy Run empties into the South Fork at a point one mile north of South Fork borough and just below the site of the dam which caused the Johnstown flood. On Sandy Run there are two dams, the older and lower of which is located about three miles from the borough and about 200 feet higher than the business section. This dam impounds approximately 13 million gallons of water over an area of about 3½ acres. The breast is formed by an earthen embankment with masonry core, giving a maximum depth of about 20 feet of water. The upper part of the watershed is composed of farm and wood land, the first mile and a half upstream from the reservoir being heavily timbered. A supply main 10 inches in diameter leads from this lower reservoir to the borough.

During 1909 construction was begun on a new earthen dam about one mile above the old one, on the same stream. This dam was completed and the reservoir, full to overflowing on June 1st, 1910, the overflow constituting the greater part of the supply for the lower reservoir. The capacity of this new reservair is approximately 18 million gallons, and the elevation about 300 feet above the borough. The tributary watershed is about 6½ square miles in area. The new reservoir has a maximum depth of 13 feet at the dam. The breast is 20 feet wide at the top, sloping one on one and a half on both faces, the up-stream face being paved for a distance of ten feet from the top. The embankment is carried to a height of 5 feet above the normal flow line of the reservoir. At each end of the embankment there is a spillway cut into the solid rock and lined with concrete, each being 10 feet wide and carried along the side of the hill for a distance of 40 feet, delivering the overflow below the tie of the dam so as to avoid injury to the structure. The reservoir may be drained by a 36 inch cast-iron blow-off pipe extending through the dam at the deepest point near the bottom, controlled by a gate valve located in a stone gate house at the down-stream toe of the dam.

Thirty-five feet west of this blow-off there is a masonry intake chamber 10 feet by 12 feet in plan, located on the up-stream side of the dam, in which three or more 12 inch valved inlets permit taking off the water at different levels as desired. From the intake chamber two 12 inch pipes pass through the dam to a controlling gate chamber at the down-stream toe of the dam where they connect with a 16 inch supply main passing down the valley to a point just below the lower dam. Here this line connects with the 10 inch supply main from the lower dam leading into the town. A blow-off at the control gate chamber at the upper dam allows the draining of any of the pipes or the gate chamber.

During the past few months the water company has constructed an 8 inch main leading from the lower dam to the borough and through this it is reported that all of the water used for industrial purposes will be supplied, the lower reservoir being covered for this purpose and the domestic supply being taken entirely from the upper reservoir.

The distribution system consists of pipes ranging in size from the 10 inch supply main down to 1½ inch and 2 inch wrough-iron pipes, most of the pipes being smaller than 6 inches in diameter. The system is well valved but on account of the rugged topography there are many dead ends. Adequate plans of the distributing system are not in existence, although the rough draft filed with the Department purports to show the location of all the pipes and appurtenances. The entire built up section of the borough is well supplied, as are also the thickly settled districts in the townships adjacent.

There is an emergency intake located a mile below the lower dam and just above the junction of Sandy Run with the South Fork. Here there are also several springs which furnish a considerable flow of water even during extreme dry periods. A small pump has been installed for the purpose of pumping both spring and creek water into the 10 inch gravity supply main at this point. It has been customary during wet seasons to draw the entire supply through the 16 inch main from the upper reservoir. Quoting from the engineer's report "The emergency intake is located a mile north of the lower intake just above the junction with the South Fork Branch. At this point there are numerous springs which furnish quite a flow of water during the extreme dry season and there is installed a small pump which takes the water from these springs and the flow from the creek and pumps it into the main at this point." During dry periods the upper source is used only during the day and the lower reservoir at night. In extreme dry periods the supply is supplemented by pumping as above noted. The conditions above the springs and emergency intake are such as to render the use of this supply extremely dangerous. The average consumption is reported to be 630,000 gallons daily, of which 285,000 gallons are used for industrial and 345,000 gallons for domestic purposes.

The watershed above the lower reservoir on Sandy Run was found upon inspection in the spring of 1910 to contain 43 properties, at 8 of which there were pollutions. Included in these pollutions was a private sewer, afterward disconnected, leaving from a house in which there was a typhoid fever case and discharging directly into the run above and near the upper reservoir. The epidemic of typhoid fever in June and July of last year was probably attributable to this source of infection. Below the lower dam and above the emergency intake there are numerous small farmsteads, including a small cross-roads settlement about a half mile below the dam.

During the investigation of the epidemic, samples were taken at various times of the public water supply and analyzed at the Department Laboratories. The water in the reservoirs was disinfected between the 11th and 14th of July. The results show the continued presence of B. Coli in tap samples attributable to residual pollution in the water mains, which repeated flushing finally eliminated. The results of the analyses are given below:

	Bacteria per c. c.	B. Coli per c. c.
July 10th, 1910.		
Upper reservoir—inlet,	600	1
Upper reservoir—outlet,	400	5
Tap, O'Neil Hotel,	500	0
Tap, Henry Mackell,	850	5
Tap, Jobes,	400	10
Tap, McIntyres,	400	40
Tap, Wm. Davidson,	800	33
Tap, Samuel Muncy,	3,000	2
Tap, Wm. H. Moore,	48	4
Tap, A. D. Strong,	270	20
July 19th, 1910.		
Upper reservoir—inlet,	44	3
Upper reservoir—outlet,	10	0
Lower reservoir—outlet,	56	0
Tap, Hotel Crouse,	150	2
Tap, Dr. Reed's office,	80	3
Tap, Joseph Eplett,	100	4
Tap, Clara Wall,	120	1
July 26th, 1910.		
Tap, A. D. Strong,	100	0
Tap, Thomas Skipper,	110	5
Tap, Wm. Davidson,	84	6
Tap, G. S. Pantano,	280	4
Tap, O'Neil Hotel,	70	0
Tap, Henry Mackell,	42	0
July 27th, 1910.		
Tap, Dr. Reed's office,	52	

Subsequent to the order dated July 25th, 1910, hereinbefore quoted, the Commissioner of Health issued the following communication:

"August 3rd, 1910.

"The South Fork Water Company,
"South Fork Borough, Cambria County, Pa.,
"Dear Sirs—

You have, in defiance of the provisions of Act No. 182 of 1905, obtained an additional source of supply without making application to or receiving a permit from the Commissioner of Health and you have done this in the face of an epidemic of typhoid fever in the town which commonly attributed to the public water supply. This is to notify you that I shall place the matter in the hands of the Attorney General to enforce the penalty of the law for every day in which you furnish this water to the public and I shall also request that inquiry be made by the Attorney General why quo warranto proceedings should not be had against your company, to annul the charter unless you forthwith satisfy the State Department of Health of your ability to furnish a pure and wholesome water to the public within your charter territory and unless you satisfy me that you will make every effort to do this in a temporary manner and in a permanent manner.

"Yours very truly,
(Signed) SAMUEL G. DIXON."

On August 5th the Vice President and Superintendent of the water company visited Harrisburg and promised immediate compliance with the terms of the order of July 25th, 1910, and also gave assurance that the emergency pumping station had been disconnected and would not be used except in case of shortage of water on and then only subject to the approval of the Commissioner of Health.

These facts indicate that the emergency supply had been used without approval. The water company had not employed experts or submitted plans to the State Department of Health for filtration at the conclusion of the year.

Mr. Irwin reported as follows relative to the conditions of the watershed, the water consumption, the disinfection of the supply, analyses of the water and his conclusions:

"The drainage area above the reservoirs on Sandy Run was inspected by officers H. S. Kauffman who reported May 27th, 1910 that there were 43 properties located on the shed. Seven of these properties were unsanitary and notices were served. On July 18th Assistant Engineer Shaughnessy found a sewer with a bath and closet connected drainage to the stream which entered Sandy Run and then the new reservoir. This sewer was located on the property of E. E. Baumgardner where there was a case of typhoid fever. The fever patient. Mahlon J. Baumgardner, was attended by a physician from Scalp Level who had told the family that the patient was suffering from typhoid fever but he had not reported the case to the Health Officer or to the State Department. The patient had come to his home from Albright College in Myerstown. He arrived home May 25th and was still suffering from the effects of the fever at the time of inspection. Mr. Shaughnessy made reinspections of the other 7 properties where pollutions had been found. Mr. Baumgardner resisted efforts to disconnect this sewer, considerable time elapsed before a satisfactory agreement was reached, meantime, the sewer was cut off by the Department. Mr. Shaughnessy has given full details of this matter in his report. Mr. Shaughnessy also found that there had been another case of typhoid fever on the watershed during the month of March. This case was that of Bertha E. Thomas and from all appearances every precaution had been taken and no infection could have come from this case.

The distributing system is very complete. The whole of the built-up section in the borough being well supplied with water as well as the populous district in the townships adjacent to the borough. The house services are not equipped with meters and much water is wasted because of poor plumbing. There is no way of obtaining an accurate estimate of the daily consumption. The Superintendent of the water company estimates that the daily consumption was about one-half million gallons including both the domestic and manufacturing supply. There are probably about 6,000 water consumers and as the plumbing is poor the consumption is certainly equal 100 gallons per capita or 600,000 gallons. To this should be added the water used by several manufacturing concerns. It is thought therefore that the estimate of one-half million gallons is too small and the actual consumption is probably 1,000,000 gallons.

"At the time of the fever outbreak the new reservoir contained about 18,000,000 gallons and the old reservoir 13,000,000 gallons. The new reservoir had been the only supply with the exception of two days about June 1st when water was used from the old reservoir so that a new connection could be made at the outlet to the new reservoir.

On July 9th at a meeting attended by County Medical Inspector. Dr. Matthews, Mr. Shaughnessey, the local Board of Health and a representative of the water company, it was decided that the public supply should be treated chemically. This meeting was on Saturday and in the evening an effort was made to obtain cooped sulphate with which to treat the water but sufficient amount could not be secured in Johnstown. Two hundred pounds is said to have been obtained by Health Officer Edwards and this was stored in the city building ready for use. Dr. Matthews had 300 pounds of copper sulphate ordered from Pittsburgh, and it was to be used in the reservoir water Tuesday morning also the supply stored in the city building was sent to South Fork. On Tuesday morning it was found that the Pittsburgh firm had not sent copper sulphate but had sent iron sulphate. As this disinfection was at the new reservoir 4 miles from the borough it was thought best that it should be used and it was added to the water in the reservoir in the usual manner in which copper sulphate was used. It was also found that the 200 pounds which was stored in the city building was iron sulphate instead of copper sulphate. This was returned to Johnstown. Dr. Matthews again ordered copper sulphate from Pittsburgh and secured 100 pounds of copper sulphate in Johnstown. When the second shipment from Pittsburgh arrived Wednesday, it was found that again iron sulphate was sent and this was returned to Pittsburgh. The 100 pounds from Johnstown was what was desired and was used. On Thursday another shipment was received from Pittsburgh and this time 300 pounds of copper sulphate came. Two hundred pounds of this was used in the new or upper reservoir and the 100 pounds remaining was used in the old reservoir. Three hundred pounds of copper sulphate and one barrel of copperas weighing 386 pounds was used in the new reservoir containing at least 18,000,000 gallons of water.

"On July 10th water samples were obtained from the new reservoir and at various taps about the borough.

"On July 19th samples from both the new and old reservoirs and various taps around the town were collected and sent to the laboratory. Also samples were obtained from the small stream into which the sewer from the Baumgardner property empties.

"The public supply was again sampled on July 26th, 27th and 28th, these collections being made by Mr. Shaughnessy. The results and dates of collection of these samples from the public water supply are as follows:

(See table hereinbefore given.)

"The analyses of the water supply and the inspection of the shed showed that sewage organisms were entering the new reservoir, that the small stream receiving the sewage from the Baumgardner property was exceedingly high in sewage organisms and that the sewage from this property was carried very quickly into the new reservoir. Because of the location of the fever patient on the Baumgardner property and knowing that sewage from this property entered the distributing system in South Fork and from the distribution and from the distribution and character of the cases within the borough and surrounding parts of the township furnished by the water company, it is concluded that this first fever case on the watershed was the cause of at least a greater number of the typhoid fever cases during July and August."

Mr. Shaughnessy sent in several reports from the field from which the following excerpts have been taken:

"In reference to the pollution at Baumgardner's will say, that the property is apparently one of the most cleanly in the township, with its macadam drives, cement walks and well-kept lawns. Mr. Baumgardner is an up to date farmer and runs his own automobile. There is a beautiful spring near the back door and a wind mill pumps the water from it to the attic and the barn.

"There were two outside privies. The overflow from the spring is carried in a pipe by the kitchen where it empties into the sewer from the house. This sewer is 9 feet underground. Wash water from buggies and automobiles and from the house is conducted by a terra-cotta pipe for at least 1,000 feet to the stream. Mrs. Baumgardner told me that there was a sewer but that they had not used the bath and the closet during the summer. The two outside closets have been put into commission. The kitchen water and wash water from the dwelling are carried to the pigs and spread broad-cast on the field, but in my mind it seemed very unlikely with a typhoid fever patient in the upstairs of the house that the use of the sewer would be abandoned. I took samples of the water from the stream below where the drainage enters. (See table of analyses.)

"Kauffman visited this house about June 27th with Mr. Luke, Superintendent of the South Fork Water Company and they both say that Mrs. Baumgardner told them that the bath and closet were not in use. Kauffman gave orders that a cesspool be built and that this must be used whenever the sewer was put in use. I think I have been faked on this Baumgardner case. Dr. Brinham told the family on May 26th that the case was typhoid fever but never reported it. Dr. Brinham on the 29th of June, told in their presence that he had attended a typhoid fever patient from Albright College. About July 15th a diagnosis was made and consultation of the physicians with a finding that it was an incipient case of consumption.

"Mr. Baumgardner wanted to get the water company to build him a cesspool, which they refused to do and when I served the notice he said he would do nothing unless it showed from the water test that he was polluting the stream. I think we will have to make information against him."

The Department consulted an Attorney, plugged up and cut off the sewer near the house and Mr. Baumgardner finally selected a place to build a cesspool and constructed the same.

Individual Water Supply.

There are few wells or springs in use within the borough limits. These were inspected and samples taken from a few of those suspected of being polluted. The results are as follows:

	Bacteria per c. c.	B. Coli per c. c.
July 10th, 1910.		
Well, Susan Hardy,	48	0
Well, Michael Harris,	12	1
Well, W. E. Rogers,	12	0
Well, John Burkett,	2,400	30
Spring, Sharpless,	6	0
Spring, W. H. Jennings,	78	0
Spring, Gillespie,	80	0
Spring, Henry J. Thomas,	68	0
July 27th, 1910.		
Well, Jos. Wicks,	140	0
Spring, Argyle No. 1,	1	0
Spring, Argyle No. 2,	300	13
Spring, Wm. Richards,	8	0
July 19th, 1910.		
E. W. Baumgardner, stream outlet from house,	3,400	400
E. W. Baumgardner, drainage from house,	54,000	2,400
July 28th, 1910.		
E. W. Baumgardner, No. 1,	7,000	3,000
E. W. Baumgardner, No. 2,	18,000	540

It is thought that these springs and wells had little if any part in the cause of the typhoid fever but some were improved and protected from surface drainage so that they would not act as secondary sources of infection. The Burkett well and Argyle spring No. 2 were permanently closed.

Public Sewer System.

On June 6th, 1910 the Commissioner of Health issued a decree in regard to sewerage to the borough of South Fork in response to several applicants by the borough for permission to extend its sewer system and to discharge the sewage therefrom into the Little Conemaugh River within the limits of the borough. This decree is given in full and describes the general conditions of the borough and discusses the sanitary situation:

"The borough of South Fork is located ten miles northeast of Johnstown at the junction of the south branch of the Little Conemaugh River with the main stream. It is on the Pittsburgh Division of the Pennsylvania Railroad and also the junction point of the Dunlo and Summerhill branches of the Pennsylvania Railroad with the main line. An electric line has recently been extended from Johnstown to South Fork. It is bounded north, east and west by Croyle Township, and on the south by Adams Township.

"The borough is essentially an industrial community having an estimated population of six thousand persons. In nineteen hundred South Fork had a population of two thousand six hundred and thirty-five and in eighteen hundred and ninety, one thousand two hundred and ninety-five. In the last ten years the borough has more than doubled in size and indications are that a steady growth will obtain in the town for some time to come.

"The mining of bituminous coal is the principal industry of South Fork. There are in the borough and immediate vicinity at least eight mines employing a total of two thousand and two hundred men, the South Fork Mining Company employing about four hundred men, the Argyle Mine with five hundred to six hundred employees, and the Priscilla Coal Company giving employment to about one hundred and twenty-five men. In addition to the coal operations in the immediate vicinity, a large amount of coal is shipped into the town over the branches of the P. R. R. increasing the activity of the borough in this respect.

"The South Fork Brewing Company's plant is located along the east bank of the South Fork branch at the intersection of Maple and River Streets. Eighteen persons are employed in the plant and the public water supply is used for all purposes. The building is equipped with flush closets and an eight inch sewer line leads from the plant to the river through which is discharged sewage and manufacturing wastes. The storm water from the plant reaches the river by way of the surface of the ground.

"The South Fork Foundry and Machine Company with twelve employees is situated on the west bank of the South Fork branch opposite the brewery. Here also the public water supply is used and a privy, over a plank-lined vault, located about two hundred feet from the stream is maintained for the use of the employees. There is no discharge of manufactural wastes from this plant into the river.

"On the same side of the river and about five hundred feet up stream is located the plant of the South Fork Fire Brick Company, employing fifty-three hands. The public water supply is used for all purposes and the waste water is discharged into the river through a twelve inch outlet sewer to which are connected four inch lateral sewers extending though the works. The larger part of the discharge consists of condensing water from the power plant. Some roof water finds its way into the sewer system. Connected with and directly over the twelve inch outlet sewer and about fifty feet from the river is a closet used by employees.

"Directly in the forks of the two streams is the plant of the Penn Lumber and Construction Company. This concern employs on an average of thirty-five hands with a maximum of seventy-five men. The public water supply is used and a four-inch sewer extends from the office to an open ditch leading to the river, carrying off waste water from the sink. The storm water from the plant reaches the river over the surface of the ground. A closet overhanging the south branch of the Little Conemaugh is maintained for the use of the employees.

"The incorporated territory is roughly triangular in shape and covers an area of about four hundred and forty acres. About three hundred acres are urban in character and the balance suburban. The main portion of the town, which may be designated as district "A" is located in the forks of the two streams. The river valley in the borough is quite narrow and the low land along both streams is mainly occupied by the tracks of the P. R. R. Company which are located near the streams. Back of the railroad tracks the ground rises rapidly to the hill tops. The crest of the hills lies at least two hundred feet above the valley. In this section on a strip of land about fifteen hundred feet long by one thousand feet wide, is located the main portion of the town.

"Here the houses are built in a congested manner along the streets which are mostly unpaved and in several instances not yet graded. Sidewalks have been laid on part of the streets. The surface drainage of the town is partly through the existing sewer-systems, the balance finding its way to the river through the street gutters. Owing to the steep slopes of some of the streets deep gutters have been washed out in these streets by the storm water rushing down from the hill tops.

"Aside from the main part of the town there are three distinct settlements in the borough. At the eastern and up stream end of the borough along the north bank of the Little Conemaugh River, lies a cluster of about forty houses adjacent to the village of Ehrenfeld which is situated in Croyle Township. Portage Street which parallels the river, is the main thoroughfare in this settlement. The dwellings are homes of miners and are of similar construction to the buildings in the other parts of the borough. About three hundred persons reside in this locality. The ground here is hilly rising rapidly from the valley.

"The village of Ehrenfeld lies just adjacent to this portion of South Fork borough. It is a mining village of about one thousand population. A mining operation is located in the village and a number of the employees make their homes in South Fork borough. Ehrenfeld is virtually a part of South Fork and may at some future time be annexed to the borough.

"Across the river from the Portage street settlement is a section locally known as Sunshine. This district lies between Railroad Street and the P. R. R. tracks in the vicinity of the South Fork Coal Company's plant. It is a small hamlet of about forty double tenement houses located on the hillside. The ground descends rapidly from Railroad Street to a cut through which the railroad tracks extend to the South Fork Coal Company's plant. The buildings are built in a congested manner in three rows paralleling the railroad. The houses are of inferior construction without inside sanitary conveniences, each house being equipped with an outside closet. Water for the most part is supplied through street hydrants. There are no sewerage facilities whatever in this vicinity and kitchen and laundry wastes are emptied onto the surface of the ground and as a consequence the district is in a very filthy condition. The waste water from the dwellings eventually finds its way into the cut skirting the base of the hill causing a nuisance along the railroad tracks. The occupants of these tenement houses are nearly all of foreign birth.

"The remaining built-up portion of South Fork borough, for convenience called district "B" is found in the down stream end of the borough on the hillside west of the South Fork branch of the Little Conemaugh River. From forty to fifty houses, similar in size and construction to the buildings in the other part of the borough, are here built along Maple and Highway streets. This district as well as the Portage street and Sunshine section is purely residential, the business part of the town, which comprises a few stores and hotels, being located in the main part of town.

"There are probably in the neighborhood of one thousand buildings in the municipality, the greater portion of which are dwellings. The inhabitants of South Fork are to a large extent of foreign birth and the average dwelling is comparatively small and usually of frame construction. In general appearances the town is not prepossessing. The lack of paved streets and proper drainage facilities has given rise to unsanitary conditions in at least some of the highways. The conditions are particularly bad in the alleys and in some instances drains from dwellings discharge kitchen and laundry wastes onto the surface of the ground, this practice causing nuisances.

"Water for public use is furnished by the South Fork Water Company. This corporation was chartered August first, eighteen hundred and ninety-two with charter rights in South Fork borough. The water works system was first constructed in eighteen hundred and ninety-two and is now supplying the borough and a limited district adjacent thereto. About five thousand people avail themselves of this supply and the total daily consumption is estimated to be about two hundred and fifty thousand gallons.

"It is a gravity system, the supply being obtained from small streams tributary to the South Fork Branch of the Little Conemaugh River. Intake dams have been constructed on Croyle Run, Flenner Run and Sandy Run. All of these streams rise in mountainous territory south of the borough the first two mentioned runs being within a mile of the borough. Both of these streams are small and the dams located therein are in the nature of catch basins. From the Croyle Run dam a three inch supply main leads into the town. From the Flenner Run dam an eight inch pipe-line extends to the ten inch supply line coming down to the town from the Sandy Run dam. By the dam on Sandy Run an impounding reservoir has been created covering an area of about three and a half acres with a capacity of approximately thirteen million gallons. The dam is placed about two hundred feet above the business part of South Fork. The reservoir is approximately twenty feet deep.

"The water company has a few miles of pipe lines in the streets and a few fire hydrants. Some water is supplied to the Pennsylvania Railroad for boiler purposes. The average pressure in the borough is about eighty pounds.

"The drainage areas are generally wooded. Possibly one hundred people in about twenty houses are found on the watersheds above the intake reservoirs.

"South Fork has a combined sewerage system which receives surface water, roof drainage and house sewage. The system is divided into two sewer districts, the outlets from which empty into a common ditch, the sewage finally discharging into a common ditch, the sewage finally discharging into the Little Conemaugh River about three hundred feet up stream from the junction of the South Fork branch with the main stream. The entire system is in district "A."

"The sewers range in size from eight inches to thirty inches in diameter and aggregate a total approximately eleven thousand feet. The sewers in general have been laid on grades ranging from three to eight per cent. They are ventilated through perforated manhole covers and are not underrained. In times of severe storms the sewers are said to be over taxed. Owing to the steep grade at which the sewers are laid no trouble is experienced in obtaining therein a self cleansing velocity of flow.

"The main sewer sub-district comprises that portion of district "A" lying south of Maple Street and East Lake Street. The outlet is through two twenty-four inch tile pipes extending from the intersection of Lake Street and "B" alley two hundred and fifty feet west on "B" alley to the Dunlo branch of the Pennsylvania Railroad. It passes under the railroad through a thirty-six inch cast iron pipe discharging into an open ditch at the southeastern corner of the South Fork Brewing Company's property. From this point the ditch extends in a general northwesterly direction, the sewage passing under Maple Street through two twenty-four inch pipes for a distance of seven hundred feet to the Little Conemaugh River entering this stream at the northeastern corner of the Penn Lumber and Construction Company's property. About two hundred and fifty feet above the mouth of the ditch a twenty-four inch outlet pipe from the Railroad Street district enters the same. Tributary to the outlet from the main sewer sub-district are nearly nine thousand feet of sewer ranging in size from eight inches to eighteen inches in diameter, nearly all of which are twelve inches and larger in size. These sewers have been installed on portions of all of the principal streets in this district.

"The balance of the existing sewer system lines north of Maple Street, extending easterly in Railroad Street for a distance of about one thousand one hundred feet. It is eighteen inches in diameter and tributary to it are short laterals of Fifth Alley, Third Alley, Main and Lake streets. The outlet is through a twenty-four inch line, three hundred feet long extending westerly from the intersection of Railroad and Lake streets to the sewer ditch.

"In a report made by the borough on July thirtieth, nineteen hundred and six, it appears that at that time there were eight hundred and eighty buildings in the municipality of which number two hundred and twenty-six were connected with the sewer system serving a population of nine hundred and twenty-five persons. Of this number about two hundred persons resided in the district served by the Railroad street system and the balance in the main sewer sub-district. It was estimated at that date that the average daily discharge from the sewerage system amounted to two hundred thousand gallons. The present discharge from the system has not been ascertained nor is it known to the Department how many sewer connections have since been made. The major portion of the South Fork sewer system was installed in eighteen hundred and ninety-five and few extensions have been made since that date. There are said to be from forty to fifty cesspools and over six hundred privies in use in the borough, probably three fourths of the population not being served by the sewer system.

"There is a dam across the Little Conemaugh River about one mile down stream from the South Fork branch. Water in the river backs up for at least one quarter of a mile above the dam. A water supply main, said to be twenty-four inches in diameter, extends from the dam down the valley to the Cambria Steel Company's mills at Johnstown and the water carried therein is used at the mills for various manufacturing purposes.

"During the droughts of nineteen hundred and eight and nineteen hundred and nine, the Little Conemaugh River became very low and at times during both years there was little or no flow of water in the stream between the dam and the city of Johnstown, the water standing in pools along the course of the river. Under normal conditions, however, there is a flow of water over the dam.

"The application of nineteen hundred and six was for permission to construct two fifteen inch lateral sewers for storm water purposes only. The following is a copy of each ordinance::

"ORDINANCE NO. 39"

"An Ordinance Providing For A Storm Sewer In Church Street In The Borough Of South Fork.

Section 1. Be it enacted and ordained by the burgess and town council of the borough of South Fork and it is hereby enacted and ordained by the authority of the same, that a storm sewer for the purpose of carrying off surface water and for no other purpose, be constructed along and under Church Street in the said borough with fifteen inch terra cotta sewer pipe by the following courses and distances:

Begining at a manhole in said Church Street where the same is intersected by Grant Street, thence following the centre line of said Church Street north sixty-nine and sixteen hundredths degrees east, ninety feet: thence north sixty-eight and thirty hundredths degrees east, five hundred and fifty-three feet to a point in the centre of the said Church Street where the same is intersected by the old cemetery road.

Section 2. That sufficient funds for the construction of the said sewer not otherwise appropriated, are hereby appropriated out of the general fund.

Passed finally November tenth, A. D., nineteen hundred and six.

W. W. DUNMIRE,
President of Council.

Attest: JOHN MUGRIDGE, Borough Clerk,

Approved November 10, A. D., 1906.

ALFRED SCHOFIELD, Burgess."

"ORDINANCE NO. 40.

"An Ordinance Providing for a Storm Sewer in an Unnamed Alley in the Borough of South Fork, Pa.

Section 1. Be it enacted and ordained by the burgess and town council of the borough of South Fork, and it is hereby enacted and ordained by the authority of the same, that a storm sewer for the purpose of carrying away surface water and for no other purpose, be constructed along and under an unnamed alley in the said borough of South Fork, lying between Lake Street and the Dunlo Branch of the Pennsylvania Railroad and south of Maple street with fifteen inch terra cotta sewer pipe by the following courses and distances:

Beginning at a point in said alley two hundred feet south of the main sewer; thence following said alley south eighteen degrees east one hundred and fifty feet to a point near the oil tanks of the Atlantic Refining Company.

Section 2. That sufficient funds for the construction of the said sewer, not otherwise appropriated, are hereby appropriated out of the general fund.

Passed finally November 10, A. D., 1906.

W. W. DUNMIRE,
President of Council,

Attest: JOHN MUGRIDGE,
Borough Clerk,

Approved November 10, A. D. 1906.

ALFRED SCHOFIELD, Burgess."

"The object of the Church Street sewer was to do away with the trouble caused by storm water flowing down the gutters in this street. The grades of which are over eight per cent.

"The borough solicitor was informed that the building of a drain for the discharge of storm water only did not come within the supervision of the State Department of Health and no action was taken on this first application for this reason.

"The borough authorities represent owing to the growth of the borough and the construction of dwelling houses in portions of the town in which no sewerage facilities are provided and because of the unsanitary conditions existing on the streets and alleys of the borough due to the discharge of household wastes into the gutters through open ditches and private sewers, it has become necessary to make extensions to the existing sewer system.

"The proposed extensions provide for the completion of the sewer system in the main part of the town for the installation of sewers in the balance of the built-up section.

"In district "A" the extensions proposed will be tributary to the present outlet. Most of the sewers will have over a three per cent grade and at least in one case a twenty-five per cent slope will be obtained. In only one instance will a sewer be put in with a grade under one per cent., in this case a slope of sixty-nine hundredths per cent. being obtained. The streets in this section are nearly all hilly and a self cleansing velocity of flow in the sewers here should be obtained without any difficulty.

"In the southeastern part of district "A" an eight inch sewer twelve hundred feet long will be installed on Lake street extending southeasterly from the intersection of Lake and Main streets to the borough line. This will connect with the present sewers through an eight inch diameter pipe starting at a depression in Lake street, five hundred and sixty-three feet northeast of the southern borough line and extending westerly down the hill side for about four hundred feet to the eastern side of the Dunlo branch of the Pennsylvania Railroad. From here it will continue down stream for two thousand feet in a northwesterly direction paralleling the railroad tracks, to a point along the railroad midway between Church street and "C" alley where it unites with the main sewer system. This sewer is designated as the "Rockville sewer." The plans show that the eight inch connecting line is to be constructed for a distance of two thousand feet without any manholes and on a uniform grade of seventy-five hundredths per cent.

"In the Portage Street district an eight inch sewer is to be installed extending from Wilson Street northeasterly in Portage Street for twelve hundred and fifty feet to the eastern borough line with a minimum grade of one per cent. The outlet will be eight inches in diameter starting from a manhole on Portage Street six hundred feet west of the borough line extending down stream between Portage Street and Summerhill branch of the Pennsylvania Railroad, which here skirts the base of the hill, a distance of nine hundred and ninety feet. From this point the outlet will pass under the railroad trachs, and swinging to the left, continue in a general southwesterly direction for eighteen hundred and fifty feet along and close to the north bank of the Little Conemaugh River to the arch culvert of the main line of the Pennsylvania Railroad. The mouth of the outfall sewer will be one hundred and fifty feet up stream from the sewer ditch outlet from district "A." The last seventeen hundred feet of its length the outfall lower will be placed in a trench from one and a half to two feet deep. For a short distance a fill will be required to cover the pipe. Except for the last nine hundred and thirty feet, where a grade of fifty-eight hundredths per cent. will be obtained, the outfall sewer from this district will have a minimum grade of one per cent.

"The system will drain fourteen acres, has forty possible connections and will be required to care for approximately eight thousand gallons of domestic sewage daily. Including the outlet it will comprise about four thousand feet of sewer pipe.

"The Sunshine district will be served by an eight inch sewer extending from the eastern borough line five hundred and fifty feet in a westerly direction paralleling the Pennsylvania Railroad tracks and about one hundred feet south therefrom. To this sewer lateral sewers extending through the settlement will connect. It will end in a manhole from which an outfall sewer eight inches in diameter is to extend due north down the hillside and under the tracks of the Pennsylvania Railroad main line and thence down stream in a westerly direction, closely hugging the south bank of the Little Conemaugh River to the arch culvert of the main line of the Pennsylvania Railroad. It will enter the stream just opposite the outlet from the Portage Street district.

"In the Sunshine district also an eight inch sewer is to be installed in Railroad Street extending east from Sixth Alley for eight hundred feet to the South Fork Coal Company's plant. A connection is to be made from this sewer to the Sunshine outfall line through an eight inch sewer one hundred and eighty feet long extending north from Railroad Street and passing under the railroad tracks to the outlet line.

"The entire Sunshine district system, including the outlet and exclusive of the laterals in this settlement, these have not yet been fully decided upon, will comprise forty-three hundred feet of eight inch sewers draining an area of forty-three acres in which there are seventy-two possible sewer connection. The flow of domestic sewage daily is estimated at fifteen thousand gallons.

"From the arch culvert about two thousand feet up stream, the Sunshine outfall sewer will have a grade of five tenths per cent. For the balance of the system the mimimum grade will not be less than one per cent. The outfall sewer will be placed in the trench averaging one and a half feet in depth. For four hundred feet of its length a fill will have to be made to cover the pipe.

"The outlet for the proposed system in district "B" will be through an eight inch line two hundred and ninety feet long extending from the intersection of Highway and Cross streets in a northeasterly direction to the South Fork branch of the Little Conemaugh River, discharging into this stream at the point of its junction with the main stream. This system will comprise including the outlet about two thousand two hundred feet of eight inch pipe laid on a minimum grade at five per cent. except for a distance of one hundred and thirty-nine feet on Cross Street where there will be a grade of six tenths per per cent.

"The total section to be drained by the proposed extensions amounts to ninety-five acres. In this area there are about four hundred sewer connections possible of which number over two hundred connections may be expected the first year. If installed as proposed the extensions will aggregate three and two tenths miles which with the sewers already in, will make a total in the whole system of about five and five tenths miles of sewers.

"Improved sewerage facilities are needed in the borough. The local Board of Health is handicapped in its efforts to maintain a sanitary condition in the town by the lack of adequate sewerage facilities. A borough ordinance is in effect requiring property holders to connect abutting properties to the existing sewer lines. The installation of sewers on all streets will give the local authorities an opportunity to correct existing nuisances. The proposed sewers are to be paid for by the borough and the authorities are contemplating street improvements in the nature of grading and paving and naturally are anxious to install the sewers needed before the surface of the streets is paved.

"The Little Conemaugh River heads near the borough of Cresson in the Allegheny Mountains, thirteen miles northeast of South Fork. From its head waters it flows down through a narrow valley receiving along its course numerous tributaries which rise in the mountainous territory lying on both sides of the river. Above South Fork the boroughs of Summerhill, Wilmore, Portage, Lilly and Cresson, in addition to several small mining towns are located along the course of the stream. Drainage from these towns is into the Little Conemaugh River either directly or indirectly. In the boroughs of Cresson and Lilly sewer systems have been installed. Between South Fork and Johnstown the river flows through a narrow valley which is practically unsettled until the borough of Conemaug is reached, seven and one half miles below.

"At Johnstown the Little Conemaugh River unites with Stony Creek to form the Conemaugh River which flows from this point in a general northwesterly direction to Saltsburg, where it unites with the Loyalhanna Creek to form the Kiskiminetas River which joins the Allegheny River at Freeport. the borough of Conemaugh is reached, seven and one half miles below. which turn into the streams a vast quantity of acid mine water. The little Conemaugh above South Fork and the South Fork branch receive large quantities of acid mine water from various mines. The mines situated in the borough of South Fork add their share of this acid water.

"The Conemaugh River water is first used for domestic purposes at Blairsville approximately thirty-eight miles below South Fork. The supply passes through a distributing reservoir having a capacity less than the daily consumption. Nearly the entire population of the town use this water which receives no purification.

"Seventeen miles below Blairsville is the village of Saltsburg where over one thousand people are served with river water using daily, it is estimated about seventy-five thousand gallons. The raw river water is raised to a distributing reservoir holding about thirteen days' supply.

"From Freeport down to the mouth of the Allegheny River, a distance of twenty-eight miles, the water of this stream is used to a very great extent by the municipalities located along its banks. The largest consumer of Allegheny River water is the city of Pittsburgh in which municipality a population of five hundred thousand is served with river water. The Pittsburgh city intake is down stream from South Fork a distance of only one hundred miles.

"It is a generally accepted belief that the danger in obtaining water supply from the Conemaugh River without filtration of the water is minimized because of the disinfection of acid mine drainage of sewage, discharged into the river itself and its tributaries by the municipalities up stream. However, during times of freshets the effect of the acid in the streams may be so neutralized by the introduction of a large volume of storm water as to fail in destroying the sewage bacteria which may then be rapidly carried down stream and taken into the various water works systems through the intakes to the river. Because the purifying agencies at work cannot be controlled and regulated, it becomes a necessity in the interests of the public health to exclude from streams, which are used as sources of public water supply untreated sewage from the municipalities located on their drainage areas. If the Conemaugh River and other tributaries were not acid streams the probabilities are that the towns down stream using the river as a source of public water supply would have been visited by serious epidemics arising from water borne diseases.

"From the State's morbidity reports it appears that there occurred in South Fork borough twenty-three cases of typhoid fever and two deaths in nineteen hundred and six, twenty-three cases and seven deaths in nineteen hundred and eight; and twenty-one cases and four deaths in nineteen hundred and nine.

"According to the local authorities about eight years ago an epidemic of typhoid fever occurred in the village. The presence of these cases demonstrated the necessity for better sanitary conditions.

"In order to protect the interests of the public health, it will be necessary eventually to exclude from streams, which are a source of public water supply, untreated sewage. It is the intention of the State authorities to bring about this and in the district in which South Fork borough is located. The borough of Cresson was granted a permit on August sixteenth, nineteen hundred and seven, allowing sewer extensions to be made with the stipulations that the borough should prepare plans for the purifying of its sewage and present same to the Commissioner of Health for approval. Below South Fork, the boroughs of Scalp Level, Indiana, Blairsville, Saltsburg and Derry have all been required to prepare plans for the purification of their sewages. The boroughs are located in the Conemaugh River basin. The borough of Indiana is now engaged in the construction of sewage purification works which are to be completed on or before July first, nineteen hundred and ten. The borough of Scalp Level is required to submit plans for a sewage disposal works on or before May first, nineteen hundred and eleven, and the borough of Blairsville is now engaged in the preparation of plans leading to the discontinuance of the discharge of untreated sewage into the waters of the State.

"Plans for the collection and disposal of all sewage from the borough of South Fork should be prepared and submitted to the Commissioner of Health for approval. A site for the location of a sewage purification works should be decided upon and the plans for the plant should be made.

"The reported assessed valuation of South Fork is in the neighborhood of seven hundred thousand dollars and the borough has a bonded debt amounting to twelve thousand six hundred dollars. If these figures are correct, the bonded debt of the borough may be increased to the extent of thirty-six thousand dollars before the limit of municipal indebtedness is exceeded. This amount is probably insufficient for the completion of a comprehensive sewerage system for the entire municipality and the erection of a sewage disposal works.

"It is important now, if ever, for the South Fork borough to adopt a complete plan and this complete plan must provide for an intercepting sewer down the valley to a sewage disposal plant or to a pumping station and disposal plant. A competent engineer skilled in the art of sewage disposal should be engaged to study the problem and to prepare the detailed plans for the sewage disposal plant and intercepting sewers and when these plans have been submitted to and approved by State authorities and adopted by the borough, then laterals can be built from time to time as the borough may elect. When studying the problem the exclusion of storm water from the sewer system will be an important feature. The Department does not mean to dictate that economy at South Fork demands that all of the storm water shall be excluded but it might dictate that storm water should be excluded from the three and two tenths miles of sewers it proposes to build which sewers are to be eight inches in diameter.

"The employing of an expert to design the plans should not take a great deal of time. Some observation would have to be made of the condition of the existing sewers, their flow in wet and dry weather and during the day and night time and data would have to be collected about the volume of flow to be treated in the disposal plant.

67

"In view of the foregoing circumstances it has been unanimously agreed by the Governor, Attorney General and Commissioner of Health that the interests of the public health demand that approval of the proposed sewer extensions be withheld, and I do hereby and herein withhold such approval until the borough shall have prepared the detail plans of the intercepting and outfall sewers and sewage disposal works and submitted them to the State Department of Health for approval and until the same shall have been approved, modified and amended and a permit issued therefor.

"If the local authorities will secure the services of a consulting engineer to act with their local engineer and report what evidence of progress is being made in carrying out the suggestions of the Department, then permission may be given the borough to lay certain lateral sewers in the districts where the local board of health decrees it essential that such sewers shall be built during the current year.

"The State Department of Health will have a sanitary inspection made of the watershed from which water flows to the reservoirs supplying the borough with drinking water and the water company will be communicated with to this effect.

"All private sewers in the borough should be connected to the borough's sewer system and all overhanging privies should be discontinued. The intercepting sewers should be designed to take care of outlying villages adjacent to South Fork especially those liable to be annexed in the future; in all of which the State Department of Health will be glad to advise and co-operate with the local authorities."

On July first the borough officials asked the privilege of making a few minor sewer extensions in order to improve the sanitary condition of South Fork and the Commissioner of Health granted a permit of petty lateral sewer extensions as follows.

Alley "A"	8 inch	1,000 feet
Church St.,	8 inch	500 feet
Wilber St.,	8 inch	1,050 feet
Grant St.,	8 inch	350 feet
Third Alley,	8 inch	400 feet

In carrying on the work of the Department in suppressing the spread of typhoid fever and improving the sanitary condition of the borough it was found that the borough was greatly in need of a few short sewer connections and that permanent improvements in the sanitary conditions could not be made until these sewers were completed.

In view of this fact the borough on July 19, 1910 made application for the following sewers to be constructed at once.

Grant St.,	8 inch	180 feet
Bee St.,	8 inch	550 feet
Fourth Alley,	8 inch	850 feet

The Commissioner at once issued a permit for the making of these few extensions. An inspection was made of the borough as a whole and it was found that many of the alleys were in an unsanitary condition. The built up portion of the borough on the west side of South Fork Creek is mostly owned by the Stineman interests. At the request of the Department officials lime was furnished in large quantities for the disinfection of the gutters, unsanitary house yeards and privies in this district. The owner of this property paid the whole of the expense connected with the work in this district. The borough furnished lime and distributed it about the settlement along Portage Street and in the section known as Sunshine. This work was well done and helped to improve the condition temporarily. In the built up section in Croyle township known as Jilestown, the township officers furnished lime and had it distributed in the various places where needed and special care was taken where typhoid was located.

24. TYPHOID FEVER AT SCOTTDALE.

During June and July there was a marked increase of typhoid fever in Scottdale borough, Westmoreland county. This town received its water supply from several sources owned and operated by the Citizens Water Company of

Scottdale and the Mountain Water Supply Company. The State Department of Health and during the season of 1909 made sanitary surveys of the watersheds and caused the abatement of most of the sources of stream pollution. On July 18th, 1910 then General superintendent of the Citizens Water Company advised the State Department of Health of the outbreak of typhoid fever in Scottdale and asked to have a re-inspection. Mr. Warren S. Hood, State officer stationed at Washington borough was detailed to make the re-inspections of the watershed and Assistant Engineer Ralph E. Irwin went to Scottdale and made a canvass of the cases. Assisting these agents of the Commissioner of Health were several field men. The water company treated the water supply to Scottdale borough with chlorinated lime. This treatment having been commenced July 16th. The Department's officers did not arrive in the borough until July 19. Following is a detailed report of the Department operations.

Typhoid Fever.

Mr. N. C. Silsley, Secretary of the local Board of Health gives the following cases as have occurred by year and recorded in the secretary's minutes:

Year.	No. Cases.	Deaths.
1895,	2	0
1896,	23	1
1897,	110	9
1898,	49	4
1899,	21	1
1900,	6	2
1901,	35	0
1902,	33	2
1903,	22	2
1904,	7	...
1905,	23	1
1906,	22	5
1907,	41	3
1908,	18	1
1909,	22	...

This record does not agree with that of the Department of Health, the greatest difference occurring in the years 1906 and 1907; the record in the State Department of Health giving 27 cases for 1906 and 51 for 1907. The following table is the record of the fever cases reported to the State as they occurred monthly during the years since 1905.

	1906	1907	1908	1909	1910
January,	1	0	0	1	1
February,	0	0	0	0	0
March,	0	0	0	0	2
April,	2	0	0	0	3
May,	0	0	0	0	0
June,	0	1	4	0	2
July,	1	1	4	10	38
August,	4	6	3	2	7
September,	10	33	5	4	10
October,	5	10	1	3	13
November,	0	0	0	0	2
December,	4	0	0	0	0
Total,	27	51	17	20	78

During the last five years the greater part of the fever has occurred during the summer months. This is reported to have been true for the years prior to 1906.

In making a canvass of the final 30 cases of the 1910 summer outbreak beginning June 23rd it was found that the cases were distributed about the borough, included all classes of people and were very mild in character, there being reported but two instances were the patients were seriously ill and no deaths.

The following table shows the occurrence of the 30 cases according to the age and sex.

Years	Male	Female	Total
2—4	4	0	4
5—9	5	5	10
10—14	3	2	5
15—19	1	2	3
20—29	2	2	4
30—33	3	1	4
Total,	18	12	30

From the above table will be seen that 63 per cent. of the 30 cases were under 15 years of age and but 26 per cent. over 19 years of age.

In the house to house canvass it was learned that these 30 patients obtained their milk supply from 12 different sources. The greatest number of cases supplied by any one milk man were four. All used the city water supply and those interviewed regarding the cases condemn the water supply and named it as a cause of the fever. It was found, however, that in one case (Chas. Billheart) used water from a spring that has been tested and condemned by the local board of health. Also in a number of other cases water has been secured from springs and wells in various localities but no definite information could be obtained leading to the belief that the other sources of water could have been the cause of the diseases. In every case the properties were connected with the sewer. It should be noted, however, that in a few instances the properties on which typhoid occurred were not connected to the sewer by an inside closet as is usually done but outside closets were connected to the sewer by means of large terra cotta piping. In every such instance the outside closet was well cared for. As a whole the typhoid fever properties were in good sanitary condition and the patients received proper attention. At the time of the canvass of July 27th and 28th seven of the patients had recovered and 14 were reported convalescing. Dr. I. M. Portser, county medical inspector, visited a number of the cases and diagnosed them as typical typhoid fever.

As far as could be learned there was no connection between the cases occurring in January, March and April and those occurring in June and July. Two of the cases reported in the early part of the year are thought to have been imported.

A communication of the water company to the State Department of Health on July 18th, follows:

"Referring to our telephone conversation this morning, with reference to the borough of Scottdale, within the last five days there have been reported, as near as I can learn 19 cases of typhoid fever in Scottdale borough. Fourteen of these were reported up to Saturday, the 16th inst, and five new cases have been reported since. These cases are pretty well scattered over the town, and all but one so far heard from, used water supplied by the Citizens Water Company of Scottdale, this one exception being in a family that used well water. About one-half of the cases are children under twelve years of age.

"The borough has been supplied mainly from three intake dams at the head of Mount's Creek. The Green Lick supply owned by the company; has not been in service for several months on account of the re-building of the storage reservoir on this stream. This local supply has been supplemented by water received from the Mountain Water Supply Company, which comes from Indian Creek dam.

"As a temporary safeguard until we can be assured of the quality of the water we commenced using calcium chlorite at the rate of 10 lbs. per million gallons of water. This was commenced on Saturday the 16th inst. being introduced at the three intakes mentioned, and also in the Gibson Junction reservoir of the Mountain Water Supply Company. An examination was made of the water taken from the Scottdale mains, on July 5th, by Mr. F. N. Pease, Chemist, Pennsylvania Railroad Company at Altoona, but we have no report of this as yet. He also had a representative at Scottdale, on Saturday morning to take samples, for examination, of the three intake supplies and also of of the Indian Creek Supply.

"In addition to furnishing Scottdale, the Mountain Water Supply Company also furnishes a partial supply to the Westmoreland Water Company, Greensburg, Pa., the water furnished them being used in the territory west of Greensburg, including the boroughs of Jeannette, Penn, Irwin, and Manor. So far as we have been able to learn, no cases of typhoid have been recorded in this territory.

"The Indian Creek Water, supplying this territory, passes through the Gibson Junction sedimentation reservoir before reacing Scottdale, which holds about one day's consumption and after passing Scottdale, passes through the Hawkeye reservoir, holding about two days supply.

"An examination made yesterday by our Superintendent Mr. C. A. Spencer of Greensburg, Pa., of the territory near our Indian Creek dam, revealed the fact that the "Killarney Inn" a local excursion resort on Mill Run was discharging the drainage from the hotel into a sump, and that within the past year a box drain had been run from this pump into Mill Run, which flows directly into our Indian Creek dam. There are also two other closets located within about 30 feet of this same Mill Run. Mr. Spencer reports the conditions in this vicinity as being, in his opinion, very unsanitary. He states that the owners of this property claim that after the hotel was erected the arrangements were passed upon by the local Health Officer, and he thinks the box drain above referred to has been put in since without the knowledge of this local Health Official.

"In addition to the population which is now being supplied by the Mountain Water Supply Company in this territory, we contemplate, as soon as the necessary connections are made with the Westmoreland Water Company, supplying a portion of the water to their entire territory, in which there is, I understand, about 50,000 population. In view of the importance of this supply from the health standpoint, if the conditions are as reported by Mr. Spencer, I think steps should be taken to have this corrected, even though the present trouble at Scottdale is not due in any way to the water supply."

The citizens of the town have complained about the purity of the water supplied almost every summer from the Indian Creek watershed. There is a marked local sentiment against this supply and in favor of the mountain water from Butler Run, Spruce Run and the Ore Mine Spring.

The borough of Scottdale is a mining and manufacturing community of about 6,000 population located in the southern part of Westmoreland county in the great steel and coke region of Pennsylvania. The main offices of the H. C. Frick Coke Company are maintained in the town. There are a number of varied, important and thriving industries in Scottdale, among which should be mentioned the American Sheet and Tin plate company, the United States Cast-iron Pipe and Foundry Company and the Scottdale Furnace of the Corrigan, McKinney Company. These concerns and the large bituminous coal mine operations furnish employment to the citizens of Scottdale and to the citizens of other towns in the vicinity of which Mount Pleasant and Connellsville are the nearest.

Scottdale borough is situated in the valley of Jacobs Creek along the west bank at a point 14 miles above its mouth. The creek forms the boundry line between Westmoreland County and Fayette county to the south. It drains an open rolling territory of 57 square miles above Scottdale upon which there are many bituminous coal mines in operation, also extensive coke ovens. The evidence of sulphur mine drainage is seen in the creek at Scottdale. Most of the time the stream is highly colored and very acid.

The borough's topography is rugged and the built up part of the town lies principally on the knoll between two runs which come down from the northwest and empty into the creek. The northerly one is named Stauffers or Hawkeye Run, parallels the tracks of the southwest division of the Pennsylvania Railroad for a distance and empties into the creek on land of the Cast Iron Pipe and Foundry Company, Upper Tyrone township, Fayette county, opposite the north central part of the borough. It is only the northeastern section of the borough which is drained by this run. The water is impregnated with mine pumpage.

The other stream is called Anderson Run, is much smaller, rises a short distance north of the borough in East Huntingdon township in a district locally known as Pine Tree Extension, and empties into the main creek near the southeastern corner of Scottdale just below and opposite the borough of Everson, Fayette county.

This settlement of 1000 people is on a hill and at the foot along the east bank of the creek are the tracks of the Mount Pleasant Branch of the Baltimore and Ohio Railroad. There are branches from this railroad across the stream to the flats in Scottdale where are located the industrial plants.

The public water works system is owned by the Citizens Water Company of Scottdale, a constituent concern operated by the American Pipe Manufacturing Company. The water is furnished to Scottdale and Everson. The sources are the head waters of four mountain streams to the east of Scottdale in Bullskin township, Fayette county. The dams across these streams are elevations sufficiently high to deliver the water by gravity to the consumers. Three of the dams are at the head waters of Mounts Creek which flows southerly and joins the Youghiogheny River at Connellsville. They are named in order Mounts Creek dam, Spruce Run dam and Butler Run dam, and their drainage areas are respectively 2.33 square miles, 1.76 square miles, 1.68 square miles. On Mounts Creek watershed above the intake there are 14 occupied estates on being a store. On Spruce Run above the intake there are 11 occupied estates and a store and a church and on Butler run above the intake there are 7 occupied properties, one being a school house.

The three structures above mentioned are intakes only but the fourth dam on Green Lick Creek, a tributary of Jacobs Creek forming an impounding reservoir flooding 23 acres and having a storage capacity of 150 million gallons. The watershed is 3.4 square miles in extent mostly wooded and has upon it 20 occupied estates and a saw mill.

There are a few wells in Scottdale and one spring especially noted named Loucks spring. It is located in the heart of the town at the foot of a hill and below the public school and some dwellings. The water gushes out at the base of a small cliff in the basement of a springhouse where milk is cooled. People from the neighborhood, more especially workmen, come with pails to obtain water from this spring for drinking. The geological formation of the borough is porous shale. Test of this spring water made by the Department in the fall of 1907, showed the presence of large numbers of B. coli. In June and July of this year there was one case of typhoid fever for each month. There has been none reported for the months prior to June and none after October, but during the three months of August, September and October there were 49 cases of the disease reported, most of which occurred in August largely among mill hands employed in the vicinity and drinking water taken from this spring. The local records, if true, show that some typhoid fever has prevailed every year but in less numbers, since 1897 when there were 110 cases reported for the year. The Louck Spring has been under suspicion and its use as a source of drinking water should be abandoned. The drawing of water from the ground in inhabited districts where the soil is porous, even if there be a sewer system, is attended with some risk. While the sewers of Scottdale are quite extensive and generally used, this does not warrant the wholesale use of ground water for domestic purposes. All well waters should be examined. If the tests show contamination the wells should be abandoned, and even if the examination does not reveal sewage pollution, safety demands that the well be abandoned if the topography and the surroundings be such that it may be possible for the waters to become polluted through surface or underground channels, and the Commissioner of Health so notified the local authorities March 2, 1908. By 1910 this spring had closed up but it was not sampled as one of the sources of the town being used for drinking purposes.

Samples of water from five individual wells and springs were collected and analyzed by the Department and three of the wells were found to be polluted with sewage; one to a very high degree, the data is given in the following table:

Date	Sample.	Place.	Bacteria per c. c.	
			Total.	B. Coli.
1910.				
Sept. 12,	Well	U. B. Parsonage,	12	0
Sept. 12,	Well	215 Market St.,	180	6
Sept. 12,	Well	301 Market St.,	1,500	135
Oct. 3,	Well	Granville Backman,	160	2
Oct. 3,	Spring	Granville Backman,	170	0

Another source of supply is available and used at times viz: that from Indian Creek furnished by the Mountain Water Supply Company. Both concerns in 1910 were operated by the American Pipe and Construction Company. Statements made in 1905 by the Citizens Water Company descriptive of the two sources of supply are as follows:

"The Scottdale, Pa., water supply is taken from mountain runs coming down the western slope of the Chestnut Ridge of mountains in the townships of Bulskin and county of Fayette from streams known as the Greenlick. Mounts Creek and the two branches of Spruce creek. These runs are adjacent to each other and in the order named.

"The water is diverted from the three last named streams by stone dams built at a point on these streams at an elevation of about 1,300 ft. above tide, and conveyed through cast iron pipe lines to a storage reservoir on the Greenlick with a capacity of about 240 million gallons, and at an elevation of about 1250.0 feet above tide water, from which it descends by gravity through two cast iron pipe lines of 12 and 16 inches diameter, respectively, to the borough of Scottdale; where it is distributed through cast iron pipes for domestic, fire and manufacturing uses.

"These wastes come principally from the Mauch Chunk Red Shales and on the average have about 2 degree of hardness Clarke scale.

"I hereby certify the above to be a correct description of the sources of water supply for Scottdale, Pa."

Statement made in August, 1909 by the American Pipe and Construction Company:

"The Citizens Water Company of Scottdale owns what is known as the Green Lick storage reservoir. This reservoir has for many years been in a precarious condition due to the faulty original construction of the embankment and when our people got control of this water company several years ago, we anticipated having to make radical repairs to this embankment, and the menacing danger to life and property in the valley below the reservoir became, in our judgment, so great that we have kept the reservoir empty during the past season pending our obtaining an authorization for making necessary repairs.

"The water supply at Scottdale without the reservoir can only be depended upon for about 300,000 gallons per day in the dry season, and if the reservoir were in good condition and full at the beginning of the dry season, the supply would be good for at least 1,800,000 gallons per 24 hours capacity being 150,000,000 gallons and the watershed tributary thereto about 7.6 square miles.

"The consumption of water at Scottdale runs as high as 2,000,000 gallons to 2,250,000 gallons per day at the present time, and by proper arrangement the deficiency of supply has been made up by drawing from the 30 inch main from Indian Creek, which main runs right through the center of Scottdale, along the Pennsylvania Railroad.

"Recently, as you are aware, the State Board of Health has ordered the Water Company not to take water from Indian Creek on account of the possible danger of typhoid fever. We proved however that the danger from this source is extremely remote because there is no contamination near the Indian Creek intake pipe. The reservoir holds over 200,000,000 gallons, and a bacterial analysis showed the water to be free from coli and showing a very small number of bacteria. We nevertheless adopted strenuous measures to prevent any danger of disease by applying the proper amount of hypo-chlorite of lime (bleaching powder) to all the supplies, including the Indian Creek, which were in use by the Citizens Water Company of Scottdale. This has been done without cessation for several weeks and within three days of the notice from the Board of Health of typhoid fever. The repairs to Green Lick reservoir will necessarily have to be done as quickly as possible so as to get the work finished during this dry season, and it will be necessary to resume the supply from Indian Creek. We would like to get consent from the State Board of Health to turn in this supply. We will give your organization every facility for making frequent examinations of the water, if they deem it necessary, but of all the people who used this supply for drinking, all along the Monongahela Division, southwest Penn and Pittsburgh Divisions, we have heard of no case of typhoid fever resulting therefrom."

Sanitary Survey of Watershed in 1909.

The Department's first activity relating to the water supply to Scottdale was in the year 1907 and consisted of furnishing sample bottles to the local Board of Health and the making of bacteriological analyses of water so collected. In the following table are given the results of analyses as reported to the Scottdale Board of Health.

Date.	Sample—Place.	Bacteria per c. c.	
		Total	B.Coli.
1907			
May 10,	Public,	3,400	0
Aug. 14 ,	Public,	350	0
Sept. 12,	Public.	240	0
Sept. 12,	Private, Louck's Spring (after rain),	300,000	2,500
Oct. 10,	Private, Louck's Spring, No. 1,	20,000	66
Oct. 10,	Private, Louck's Spring, No. 2,	14,000	0
Oct. 10,	Private, Louck's Spring, Overflow,	3,100	0
Oct. 10,	Public, at Silsley,	560	5
Oct. 10.	Public, at Sara Werts,	130	0
Oct. 10.	Public, at Stantys,	3,200	32
Oct. 22,	Well at McMahon Hotel,	230	2
Oct. 22,	Well at Lansdusky,	100	0
Dec. 2,	Public, Pump house,	200	0
Dec. 2,	Public, Ore Mine Spring (Mounts R),	230	0
Dec. 2,	Public, Tap in town,	110	0
Dec. 2,	Public Reservoir,	240	0
Dec. 2,	Public Reservoir,	72	0
Dec. 2,	Public Reservoir,	430	0

There was of course no charge to the borough for these laboratory examinations of the water. At that time the demands upon the laboratory were such as not to preclude rendering such service but since then it has become necessary to decline to do this work for boroughs except where the Department is making investigations or desires to confirm its opinion preparatory to the issuance of orders by the Commissioner of Health.

In July of 1908 the borough Board of Health requested the Commissioner of Health to instruct the Citizens Water Company to inspect the watersheds and to protect them from pollution, in response to the request for facts upon which the local Board of Health based its suspicion as to the purity of the water supply, on August 1st a list of properties located on the Spruce Run area was sent in. Furthermore the local board notified the water company to shut off the Spruce Run supply and to abate the nuisance on the watershed. The company shut off the supply but declined to enter upon the properties on the watershed and issue orders to abate, because of the lack of authority to do so.

"Sept. 9th, 1908.

"Dr. N. E. Silsley, Sec.,
Board of Health,
Scottdale, Pa.

Dear Doctor:—

"Receipt is hereby acknowledged of your favor dated September 3rd enclosing a sketch and communication from the Citizens Water Company of Scottdale, addressed to you in resafe-guarding the water supplied by said company. Under date of August 1st you furnished us with a list of names representing owners of property from which closet and barn yard drainage, etc., was polluting the above water supply and if you will supply the name of the township wherein these alleged sources of contamination exist, this Department will without further delay cause the issuances of notices of abatement which will be sent to the proper Health Officer for service.

"We are this day in compliance with your request forwarding you another crate of bottles to be used for sending samples of water to our Laboratories at Philadelphia.

Yours very truly,
(Signed) SAMUEL G. DIXON."

The results of the analyses of the water of mountain supplies are shown in the following table:

Date	Public water samples	Bacteria per c. c.	
		Total	B. Coli.
1908			
Sept 14,	Butler Run,	2,300	10
Sept. 14,	City Tap,	15	0
Sept. 14,	Spruce Run,	700	0
Sept. 14,	Ore Mine Spring (Mounts Cr.),	2,800	0
Sept. 14,	Greenlick, Reservoir,	450	0

Early in July of 1909 one of the Department's field officers reported that privy and barn yard pollutions were numerous on the watershed from which water was being supplied to Scottdale borough namely, Indian Creek, the regular Citizens Water Company supply was out of commission so he reported on account of repairs being made at the Greenlick reservoir. A squad of field officers was at once sent to Scottdale and at the close of the week July 12th the sanitary inspection of the Citizens Water Company sheds was completed. The following week inspection of the Indian Creek drainage area was started.

The Department found Scottdale was being supplied partly from Greenlick reservoir, Mounts Run, Spruce Run and Butler Run intakes and partly from the Indian Creek source. Immediately the water company shut off from Scottdale the Indian Creek supply and drew all of the supply from the Citizens Water Company sources until the latter was liable to depletion when the Indian Creek water was turned on as will later herein appear. The inspections did not reveal the evidence of any stream pollution from the Citizen Water Company's sources. The American Pipe and Construction Company, however, applied solutions of chlorinated lime to both the Indian Creek and other sources of supply.

"Philadelphia, July 20, 1909.

"Dr. Samuel G. Dixon,
"Chairman Board of Health,
"Harrisburg, Pa.

"Dear Sir:—

"We learned over the 'phone to-day that the State Board of Health had ordered the Citizens Water Company of Scottdale, Pennsylvania to cease taking water from the Indian Creek pipe line because there were three cases of typhoid fever on the Indian Creek watershed. We presume you have in your files all the data connected with this watershed and the water supply of the Mountain Water Supply Company. The reservoir holds over 200,000,000 gallons and the watershed now has over 100 square miles of watershed.

"As soon as we learned that there were some cases of typhoid fever in Scottdale we immediately made arrangements with Dr. J. S. Evans, 2018 Locust Street, Philadelphia to go and make an examination of the water and we are enclosing copy of his analyses. We are also enclosing a copy of letter from our Chief Engineer to our water Superintendent, Mr. J. T. Randle.

"We could not understand the conversation over the 'phone this afternoon very distinctly, but gave orders for Mr. Spencer who is in local charge of the Mountain Water Supply Company pipe lines to also use hypo-chlorite of lime at the Indian Creek intake to the extent of about 50 pounds per day and as the total consumption of water at present from the reservoir is about 6,000,000 gallons per day that give about 8 pounds per million gallons.

"We also gathered from what he said that the Board of Health had recommended our using sulphate of copper. Our own impression is that sulphate of copper is not nearly as safe a sterilizer of water as bleaching powder, or hypochlorite of lime. We hope you will pardon us but we would suggest that your Department make frequent analyses of the water from this pipe line to determine whether there is any possibility of contamination. We assure you that we are ready to do anything possible to prevent danger of disease due to the water supply.

Yours truly,
"Mountain Water Supply Company,
By H. Bayard Hodge,
Secretary."

The Citizens Water Company flushed the mains in Scottdale after shutting off the Indian Creek supply.

The Department's inspection revealed the existence of two active and four convalescent cases of typhoid fever on the watershed of Indian Creek with the probability of pollution at one other property. The officers accomplished the immediate removal of this menace. Subsequent to the inspection during October there were two other cases occurring on the watershed.

Typhoid Fever Cases on Indian Creek Watershed for the Year 1909.

Date	Name		Age	Township
	Owner of property	Patient		
Last of June,	Wm Reese,	Member of family,		Salt Lick,
	Wm. Reese,	Member of family,		Salt Lick,
	Wm. Reese,	Member of family,		Salt Lick,
	Wm. Reese,	Member of family,		Salt Lick,
August 1,	Mary A. Bowers, (Polluting property wholly removed.)	Ida Bowers.	16	Springfield
July 28,	Eli Stout,	Philip R. Stout,	22	Salt Lick.
October,	Wm. Hoffer,	Mary Hoffer,	14	Salt Lick.
October,	John B. Reese,	John B. Reese,	24	Salt Lick.

It appeared that the Indian Creek supply had not been intended originally for domestic purposes. The works were built to supply water for locomotive purposes along the lines of the Pennsylvania R. R. system. This source was first resorted to as a domestic supply at the borough of Greensburg during the drought of 1908. It was supplied to Scottdale during 1909 in order to permit the Greenlick reservoir to become filled.

On the Indian Creek water shed there found 617 properties of which 205 were in an unsatisfactory condition. 224 pollutions were removed leaving 51 properties having stream pollutions unchanged at the end of the year.

One of the milk dealers in the town was stricken with typhoid fever in Scottdale and suspicion was directed to this medium of transmission as an explanation of the increase in typhoid. The local Board of Health made investigations and closed its business temporarily.

On July 28th the Mountain Water Supply Company notified the State Department of Health that Scottdale could be supplied for about 12 days from the Citizens Water Company and then recourse would have to be had to Indian Creek water. At that time chloride of calcium solutions were being used for all the public supplies so that the water was practically sterile as far as disease germs were concerned in the opinion of the manager of the water works system. The prospect of resorting again to Indian Creek water was unfavorably received by the citizens of the borough. The people were generally boiling the water on orders of the local board and it was desired that the Commissioner of Health should force the water company to filter both the ordinary supply and also Indian Creek water when the latter should be furnished to the town.

"August 30, 1909.

"J. W. Ledoux,
"American Pipe Manufacturing Co.,
112 N. Broad St., Philadelphia.

"Dear Sir:—What is the position of the local Board of Health of Scottdale with respect to the use by your company of the Indian Creek supply, as set forth in your letter of August 25th? The writer would suggest that you ask the local authorities to approve the temporary use of Indian Creek. As I understand it, there is no choice and if this water is not furnished to Scottdale, the town will be without water.

Yours truly,

(Signed) SAMUEL G. DIXON.

"Philadelphia, September 3, 1909.

"Dr. Samuel G. Dixon, Commissioner of Health,
Water Department,
Harrisburg, Pa.

"Dear Sir:—Your letter of August 30th received. We will consult the local Board of Health in regard to supplying water from Indian Creek to Scottdale. We have lately made a complete set of bacterial determinations to determine the quality of water from the Indian Creek supply as compared with that of the local supply at Scottdale and have found that the Indian Creek water is very low in bacteria and in all cases free from colon but that the local supplies especially after rains are high in bacteria and show indications of colon. We will make further examinations of the local supplies when the stage of water is normal that is, some time after the streams have been roiled, due to rains, and if they continue the cause of any contamination that exists.

"The watersheds appear to be ideal, mountain country covered with forests and practically free from population, and it is surprising why there should be any dangerous contamination.

"We are treating all these waters with the hydo-chloride of calcium which we think is thoroughly effective to sterilize and make the water safe.

"As we are about to make repairs to the Greenlick reservoir we will discontinue the use of the storage in that reservoir immediately. Our excavating work will commence on this reservoir next Monday.

"You have stated the case correctly, that there is no choice if the Indian Creek water is not furnished to Scottdale the town will be short of water. If we had the Greenlick reesrvoir full of water there would probably be no material danger of contamination, but the reservoir cannot be filled until after the repairs are made, during the next winter months. Yours truly,

J. W. LEDOUX,
Chief Engineer."

The following table contains data that bears out the observations in the field, that ordinarily the water is fairly good but that after scouring rains it becomes highly turbid and contains much sewage pollution washed from the watershed.

Analyses of Samples of Public and Private Water Supplies in Scottdale.
Made by State Department of Health.

Date	Sample—Location.	Bacteria per c.	
		Total	B.Coli.
Aug. 13,	Private, Lawrence Medsger spring,	3,000	2
Aug. 13,	Private, John Barnhart,	2,200	0
Aug. 13,	Public, City Fountain,	6,000	0
Aug. 13,	Public, City Hall,	900	0
Aug. 13,	Public, Jonas Kennell,	180	1
Aug. 13,	Public, Ticket office,	190	0
Aug. 18,	Public, Overholt Building,	*6,000	66
Aug. 18,	Public, Post office,	*9,000	200
Aug. 18,	Public, City Fountain,	*3,000	100
Aug. 18,	Public, J. N. Kennell,	*18,000	250
Aug. 18,	Public, Frick office,	*35,000	300
Aug. 18,	Public, City Hall,	*20,000	100
Sept. 8,	Public, Market Street,	38	0
Sept. 8,	Public, Kramer House,	85	0
Sept. 8,	Public, A. S. Mail,	31	0
Sept. 8,	Public, Pittsburg St.,	16	0

*After heavy rains mixture of Indian Creek and three intakes.

Sanitary Survey of Watershed in 1910.

During the summer of 1910 the Greenlick reservoir dam was being repaired. The reservoir was empty and no water was being used from Greenlick creek and hence inspection of the properties on this shed were not made that year. No records of typhoid fever were sent in to the Department office for the Greenlick watershed.

Mounts Creek drainage area of 2.3 square miles is occupied by 13 estates and one store which were not inspected because the field officer in charge determined to his satisfaction that the Ore Mine Spring on the mountain side from which water was being furnished from the pipe line leading to Scottdale had no connection with Mounts Creek. This stream disappears into the ground beneath the surface some district back from and above the spring and re-appears on the surface near but at a higher elevation than the spring. The intake however draws its supply from the spring and not from the run. The officer used coloring matter for testing and was unable to discern any connection between the creek and the spring, and he concluded therefore that it would not be necessary to inspect the properties on the area drained by this stream. Subsequently on August 23, 1910 Edward Shaffer, 52 years of age, owner of a farmstead on the drainage area was stricken with typhoid fever.

Spruce Run and Butler Run watersheds were inspected.

Spruce Run sometimes known as Stauffer Run, the north branch, of Spruce Creek has 12 occupied properties on it, one being a school with a resident population of 36 besides 14 horses, 38 cattle and 20 pigs. The watershed is steep even near the summits, mostly wooded and no direct stream pollutions were found. During the year no cases of typhoid fever were reported to the State Department of Health either prior or subsequent to the inspection by the Department officers.

Butler Run or the south branch of Spruce Creek is a similar watershed having 6 occupied properties and a school with a total resident population of 35 people, 11 horses, 13 cattle and 15 pigs. No stream pollutions were found by the inspectors. During the year there were six typhoid fever cases on this area, all subsequent to the watershed inspection.

Typhoid Fever on Butler Run.
1910.

Date.	Owner.	Patient.	Age.	Township.
Aug. 10,	Geo. Whitkey,	Etta Whitkey,	19	Bullskin.
Sept. 21,	Henry Clark,	Norman Clark,	19	Bullskin.
Sept. 25,	Henry Clark,	George Clark,	6	Bullskin.
Oct. 22,	Henry Clark,	Harry Clark,	22	Bullskin.
Fall,	Cyrus Schaffer,	Cyrus Schaffer,	48	Bullskin.
Fall,	Cyrus Schaffer,	Amanda Schaffer,	65	Bullskin.

Spruce Run and Butler Run areas are steep and there is no storage of the water, the intake dam simply serves to divert the flow of the water so that the consumers in the town would not get the benefit of any sedimentation or polluted water that is carried by the stream.

The re-inspection of the properties on the Indian Creek watershed was completed in August. The area is mountainous covering 110 square miles in the townships of Salt Lick and Springfield in Fayette county and Donegal in Westmoreland county. Living on the watershed there are 2599 people also 858 horses, 1880 cattle and 1400 pigs. 51 re-inspections of polluting properties were made and 17 additional properties were found unsatisfactory, making a total of 68. At the close of the year there were 25 unabated pollutions on 18 properties.

For the entire year there were reported to the Department as occurring on the watershed of Indian Creek 31 cases of typhoid fever as follows:

Typhoid Fever Cases on Indian Creek Watershed.
1910.

Date.	Owner.	Patient.	Age.	Township.
May 10,	Samuel, Cramer,	Samuel Cramer,	22	Salt Lick.
Aug. 15,		Elizabeth Cramer,	[illegible]	Salt Lick.
May 10,	Samuel, Cramer,	Austin King,	19	Springfield.
Aug. 16,	Elmer Porterfield,	Theodore Gary,	21	Springfield.
Aug. 24,	Robert Douglass,	Robert Douglass,	31	Donegal.
Aug. 19,	Geo. Cramer,	Ernest Cramer,	5	Springfield.
Aug. 20,	Henry Porterfield,	Etta Porterfield,	12	Springfield.
Aug. 20,	Ephram Whipkey,	Katie Whipkey,	38	Springfield.
Aug. 21,	James Welch,	Irene Welch,	21	Springfield.
Aug. 23,	Christian Schmuck,	Nancy Schmuck,	36	Salt Lick.
Sept. 7,	Chas. Keeler,	Chas. Keeler,	31	Donegal.
Sept. 12,	Christian Schmuck,	Sarah Schmuck,	17	Salt Lick.
Sept. 12,	Christian Schmuck,	Mamie Schmuck,	19	Salt Lick.
Sept. 12,	Christian Schmuck,	Geo. W. Ritenour,	19	Springfield.
Sept. 15,	Geo. Cramer,	Carrie Cramer,	24	Springfield.
Sept. 18,	Robert Stahl,	Robert Stahl,	31	Donegal.
Sept. 19,		Clarence Burkholder,	5	Springfield.
Sept. 19,		Stella Burkholder,	7	Springfield.
Sept. 20,		Mrs. D. H. Brooke,	38	Springfield.
Sept. 22,		Curtin Brooke,	12	Springfield.
Sept. 22,		Clarence Brooke,	7	Springfield.
Sept. 22,		Leveda Brooke,	10	Springfield.
Sept. 30,		Mable Rowan,	21	Springfield.
Oct. 3,		Chas. Nicholson,	4	Springfield.
Oct. 12,	John Shearer,	Raymond Shearer,	5	Springfield.
Oct. 20,		Chas. Shearer,	18	Springfield.
Nov 16,		Wm. Pearl,	61	Springfield.
Nov. 18,		Myrtle Ritenour,	15	Springfield.
Nov. 30,		Clinton Johnson,	7	Springfield.
Dec. 10,		Randall Weimer,	19	Salt Lick.
Dec. 20,	Albert Shearer,	Albert Shearer,	60	Springfield.

For the three townships of Donegal, Salt Lick and Springfield 45 cases were reported for 1910.

In the following table are given the results of analyses of samples collected up to the time the re-inspections of the watersheds were completed and showed that the water furnished to Scottdale at intervals contained sewage organisms proving the necessity for the application of chemical germicides.

Analyses of Public Water Supplies to Scottdale. 1910. State Department of Health.

Date.	Location.	Bacteria per c. c.	
		Total.	B.Coli.
July 20	Indian Cr. water at freight yards,	6,000	100
July 20	Ore Mine Spring,	700	5
July 20	Spruce Run,	98	4
July 20	Butler Run,	68	0
July 20	927 Mulberry St.,	60	2
July 20	429 N. Broadway,	100	0
July 21	Indian Cr. water at freight yards,	800	0
July 21	Greenlick Reservoir,	400	0
July 21	Ore Mine Spring,	70	2
July 21	Mounts Creek,	52	6
July 21	711 Mulberry St.,	200	2
July 21	719 Pittsburg St.,	700	1
July 21	Spruce Run,	26	0
July 21	Butler Run,	84	2
July 21	Butler Run,	36	0
July 21	Hotel Kramer,	1,800	0
July 26	Greenlick Reservoir,	32	0
July 26	Ore Mine Spring,	38	0
July 26	Spruce Run,	6	0
July 26	Butler Run,	40	6
July 26	Indian Cr. reservoir,	140	2
July 26	Everson Ave., 300,	80	3
July 27	Greenlick reservoir,	50	0
July 27	Ore Mine Spring,	44	4
July 27	Spruce Run,	58	0
July 27	Butler Run,	46	1
Aug. 1.	Indian Creek intake,	100	3
Aug. 11	Indian Creek intake,	100	6

There has been typhoid fever on the Indian Creek watershed every year for a number of years back, while the storage in the reesrvoir on the creek is large which affords an effective barrier to disseminating the typhoid infection brought into the stored water by the runs and creeks. Most of the cases on the watershed for 1910 occurred after the outbreak of fever in Scottdale.

In the following table is shown the cases of typhoid fever reported to the State Department of Health by months from the three townships surrounding Scottdale:

Typhoid Fever Reported to the State Department of Health from the Townships Surrounding Scottdale.

1910.	East Huntingdon.	Upper Tyrone.	Bullskin.	Total.	
				Township	Scottdale.
Jan.,					1
Feb.,					
Mar.,	5	3	1	9	2
April,	1		1	2	3
May,			6	6	
June,	2			2	2
July,	3	4	1	8	38
Aug.,	11	3	13	27	7
Sept.,	8	3	5	16	10
Oct.,	1	2	10	13	13
Nov.,	2			2	2
Dec.,			1	1	
Total,	33	15	38	86	78

The rural cases were not followed up conclusively enough to warrant a statement as to the origin of the infection. It may have been contracted in Scottdale borough and it may not have been.

Even if we take Dunmore and North Union townships in Fayette county and North Huntingdon, Unity and Hempfield in Westmoreland county through which the pipe line of the Mountain Water Supply Company runs and also the boroughs within this territory of Dunbar, Everson, Greensburg, Jeannette, Manor, Irwin and Penn, the typhoid fever records do not indicate infection of a water borne character. The following table gives typhoid fever cases reported to the State Department of Health from the several townships along the lines of the Mountain Water Supply Company's mains leading from Indian Creek.

Typhoid Fever Reported to the State Department of Health from the Townships Along the Pipe Lines of the Mountain Water Supply Company.

1910.	Fayette County.		Westmoreland County.			
	Dunbar.	N. Union.	N. Huntingdon.	Unity.	Hempfield.	Total.
January,	0	0	0	0	0	0
February,	1	0	0	4	0	5
March,	3	1	0	1	0	5
April,	0	2	1	0	0	3
May,	0	4	0	0	0	4
June,	1	1	0	2	0	4
July,	1	0	2	1	2	6
August,	6	3	4	5	8	26
September,	4	1	3	2	7	17
October,	11	1	1	5	5	23
November,	17	1	0	2	1	21
December,	0	2	0	0	1	3
Total,	44	16	11	22	24	117

From Boroughs Along Same Pipe Lines.

	Connellsville.	Greensburg.	Jeannette.	Manor.	Irwin.	Penn.	Total.
January,	0	0	0	0	0	0	0
February,	2	0	0	0	0	0	2
March,	0	0	0	0	0	0	0
April,	0	0	2	1	0	0	3
May,	0	0	0	2	0	0	2
June,	0	3	0	0	0	0	3
July,	4	0	0	0	0	0	4
August,	22	21	0	0	1	2	46
September,	22	20	3	0	1	1	47
October,	17	0	2	0	0	0	19
November,	13	15	0	0	1	0	29
December,	2	6	2	0	0	1	11
Total,	82	65	9	3	3	4	166

Everson, Dunbar and Youngwood boroughs reported no typhoid fever for the year. Connellsville is supplied by the Connellsville Water Company. Greensburg cases included hospital records. A fair way perhaps to make comparison is to note how the typhoid fever cases for the entire counties of Fayette and Westmoreland compare with the typhoid fever cases for the townships and boroughs in said counties as above mentioned.

Westmoreland County.

Typhoid Fever Reported to State Department of Health.

	Special Townships—N. Huntingdon, Unity, Hempfield, and East Huntingdon.	Rural for the entire county.
January,	0	12
February,	4	14
March,	6	18
April,	2	11
May,	0	8
June,	4	7
July,	8	13
August,	28	39
September,	20	67
October,	12	67
November,	5	38
December,	1	12
Total,	90	306

Westmoreland County.

Typhoid Fever Reported to State Department of Health.

	Special Boroughs—Scottdale, Greensburg, Jeannette, Manor, Irwin, and Penn.	Urban for entire county.
January,	1	38
February,	0	33
March,	2	27
April,	6	13
May,	2	16
June,	5	13
July,	38	49
August,	31	65
September,	35	75
October,	15	30
November,	18	35
December,	9	35
Total,	162	419

Fayette County 1910.

Typhoid Fever Reported to State Department of Health.

	Special Townships—Dunbar, N. Union, Upper Tyrone, and Bullskin.	Rural for the entire county.
January,	0	13
February,	1	15
March,	8	15
April,	3	12
May,	10	9
June,	2	19
July,	6	22
August,	25	58
September,	13	75
October,	24	96
November,	18	42
December,	3	23
Total,	113	399

Typhoid Fever Cases. Data for 1910.

	Totals for State—Urban and Rural.	Totals for State—Rural.	Fayette County.	Westmoreland County.
January,	825	267	26	50
February,	580	167	19	47
March,	652	185	15	45
April,	500	184	24	24
May,	491	144	11	24
June,	424	144	19	20
July,	770	201	43	62
August,	1,886	654	88	94
September,	2,637	1,136	104	142
October,	2,310	1,131	132	97
November,	1,442	625	65	73
December,	1,010	322	28	47
Total,	13,527	5,160	574	725

General Sanitation in Scottdale.

In 1908 at the completion of the survey of the town by the Department there were 7.8 miles of sewers in the borough. There were then 1,150 buildings and all but about 300 were connected to the system. The sewers were originally planned in 1891 to take sewage only but gradually the system has been changed over to a combined one. There is an ordinance requiring all drain spouts, conductors, or openings from buildings to be connected to the public sewer by way of underground drains.

In 1908 there were 7 outlets to the public sewer system and in order up stream from the southerly borough line they were as follows: Osage street sewer, Anderson Run Culvert, Loucks Lane sewer, the Pipe and Foundry Company's sewer (Lower outlet), the Pipe and Foundry Company's sewer (Upper outlet), Park Street outlet and Chestnut Street sewer.

The Osage Street sewer is a 20 inch pipe into Jacobs Creek at the foot of said street which point is about 50 feet below the bridge over the creek at Fifth Avenue. It serves 2800 feet of lateral sewer in the district of which 2200 feet are 12 inches in diameter and 160 feet 15 inches in diameter. The balance of the pipe is 20 inches in diameter. Most of Osage Street is outside of the borough in East Huntingdon township and the lateral sewers of the district are partly in the township and partly in the borough. The neighborhood is locally known as Browntown. About one mile down the valley are the Old Meadow Rolling Mills. The trolley line extends to the plant and the hands live at Downingtown and in Scottdale.

The Anderson Run culvert is an egg shaped brick structure 5 feet high 3.25 feet wide, empties into Jacobs Creek about 1000 feet up stream above the Osage Street outlet, and extends along the north bank of Anderson Run a distance of 1220 feet from Fifth Avenue where it ends. Evidently this sewer was designed to serve a very large territory. Into it at the present time there are 8 lateral sewer connections aggregating a total length of 7140 feet. There are not over 100 houses in the district where these lateral sewers are laid and most of them are connected to the sewer. Of the total length 5700 feet are 12 inch pipe and the remainder 10 inch pipe. No street water is admitted to these sewers or the main culvert. Roof water, however, is admitted.

Loucks Lane empties into Jacobs Creek at a point 1400 feet up stream from Anderson Run. This sewer is a 24 inch pipe and the main outlet for the system which serves the business section and greater part of the town. It comprises a total of 21,000 lineal feet of sewer of which over 50 per cent. is pipe 12 inches in diameter. 2,500 feet 10 inches in diameter and there is less than 1,000 feet of pipe 8 inches in diameter. The outlet is at the foot of the Lane which was formerly a public highway, but is now discontinued between the railroad and the creek. The land is utilized by the American Sheet and Tin Plate Co.

In the district traversed by these sewers the buildings are very generally provided with sewer connections and roof water is conveyed to the sewer, but although the streets have good grades and some of the surfaces thereof are permanently paved with brick, so far as the Department is informed, there are no street inlets for the admittance of surface water to the sewer system.

Paralleling the railroad and at the foot of the hillside is Broadway upon which storm water is poured from the street gutters on the hillside and in this main highway, at the foot of Pittsburgh Street and at the foot of Mulberry Street there are surface drains constructed with inlets for the collection of storm water and its conveyance under ground to the creek.

Both sewers of the Pipe and Foundry Companies above mentioned as public outlets, had their origin in the purely surface drainage conduits, the lower one formerly extending from Broadway at the foot of Pittsburgh Street easterly under the railroads to the old creek channel and the borough boundary, and the upper one formerly extending from Broadway at the foot of Mulberry Street easterly under the railroad to the creek and borough boundary. It is reported that at its own cost and expense the said Pipe and Foundry Company in connection with large extensions of its plant, widened and straightened and deepened and made an entire new channel for a portion of Jacobs Creek, and filled in the old channel and appropriated the land for its plant and as a part of this improved drainage project, said company extended the Pittsburgh Street, and the Mulberry Street storm drain outlets easterly through its land a distance of about 1,000 feet to the new channel of the creek.

The lower outlet is a 20 inch pipe. It receives some sewage from a hotel and buildings east of the railroad and from the offices and shops at plant A and B of the said pipe and foundry company. If reports be true it also takes the overflow from the Broadway sewer at Pittsburgh Street. The point where the pipe empties into Jacobs Creek is 800 feet above Louck's Lane sewer. The portion of this sewer built by the company is now buried beneath high banks of furnace slag.

The upper outlet or the Mulberry Street drain is 1,000 feet upstream, is reported to be 30 inches in diameter, and is not known to receive sewage except that it may enter from plant C of the Pipe and Foundry Company. Several hundred men are employed, possibly five hundred at times.

Park Street sewer outlet is 24 inches in diameter and enters the creek 500 feet above the Mulberry Street drain outlet. It like the latter is on land owned by the said Pipe and Foundry Company, both outlets being in Upper Tyrone township, Fayette county. Connected with this main are 7000 feet of sewer ranging in diameter between 8 inches and 24 inches. The district now tributary is a small one in the extreme northeastern corner of the borough but a very much larger territory including land in East Huntingdon township in the allotments known as North Side Land Company's plan and East Home Place could be included. There are private sewers in each allotment and they empty into Hawkeye Run.

Chestnut Street sewer is 10 inch pipe, 500 feet long connected to 550 feet of 8 inch sewer. It discharges into a run crossing Chestnut Street near Stauffer Avenue. The stream follows a ditch between the trolley tracks and the Pennsylvania Railroad for several hundred feet and finally reaches Hawkeye Run. Into this sewer at the borough line is discharged the sewage from the private sewer system in the streets of the North Side Land Company's allotment. A part of this allotment is included within the corporated limits of Scottdale. The sewer system has a 24 inch pipe main in Stauffer Avenue and this 24 inch pipe is connected to the 10 inch pipe in Chestnut Street. So far as the Department is informed in this district sewer system are 4,500 feet of pipe whose diameters range from six inches to 24 inches. There is another sewer in this allotment. It is 18 inches in diameter and serves a few houses on Chestnut Street in the township. The outlet is into the run near where the 10 inch sewer discharges.

Opposite this allotment east of the railroad in the township on the East Home Place Tract, a new development where the streets have been laid out and the main street paved and curbed, and a few houses erected there are sewers which have an outlet into Hawkeye Run within the limits of the borough. The sizes of these sewers have not been reported to the Department. In the eastern part of this district there is a sewer from the Crescent Manufacturing Company's plant to Jacobs Creek and also a private sewer from a property under development. There are sewer outlets into Jacobs Creek in Everson borough.

So it appears that the sewers of Scottdale were originally intended to receive house sewage only and it is evident by their sizes that they were not designed to receive street drainge with the exception of the Anderson Run culvert whose capacity is entirely disproportionate to the uses to which this structure has thus far been put. Of the total length of 7.8 miles in the entire sewer system, 4.9 miles are pipe 12 inches in diameter, sewers of 10 and 15 inches in diameter approximate 0.8 of a mile in length each, the 24 inch pipe has total length of 0.4 of a mile and the remaining lineal feet of the system is about equally divided between the 8 inch, 18 inch, 20 inch and 26 inch pipes and the big brick sewer.

The system cannot therefore, be transferred into a strictly combined sewer system, but should occasion ever require it, the system may be converted economically, into a modified separate system.

It is estimated that at ordinary low stage of Jacobs Creek, one half of the flow is mine water. The large part of such water is pumped and when the coal has become exhausted and the mine operations cease, there will be comparatively little sulphur water in Jacobs Creek. A few mines are drained by gravity and this much acid addition to the natural flow of the stream in the district will continue indefinitely.

Possibly within 10 years the Pittsburgh seam, the coking coal of the district, will have become exhausted with the exception of the Standard mine, which is just above the borough of Mount Pleasant, five miles above Scottdale. When this mine operation ceases, unless the lower veins of coal, the Freeport and Kittanning, be mined, the quality of Jacobs Creek water will approach more nearly its original condition and the discharge of sewage therein at that time might be liable to produce a nuisance and to lessen the value of the waters for natural uses by the riparian owners along the stream.

The extreme acidity of Jacobs Creek has rendered fish life extinct in the stream, and it is also observed that the acids act as powerful disinfectants. No nuisance exists in the creek by reason of the discharge of sewage therein at Scottdale except in the immediate vicinity of an outlet and occasioned by sewer gases.

A complaint was filed in the Department in the summer of 1906 by the citizens of Everson wherein it was alleged that the discharge of sewage from the main Scottdale sewer opposite Everson was not into Jacobs Creek directly but that the solid matter was distributed over shoals where it lay to putrefy and produce a nuisance in the neighborhood.

Owing to the acidity of Jacobs Creek and the absolute abandonment of all use of its waters from Mount Pleasant to the Youghiogheny River in which distance of 19 miles the sewage of these places is likely to be quite thoroughly destroyed or relieved of all pathogenic power, the discharge of sewage from Scottdale sewers into this stream might with reason and without prejudice to public health be permitted to continue under approved conditions, to as late a date as any municipal sewage in the basin of the Youghiogheny River may be permitted to continue to be discharged into the waters of the State.

Conclusions.

The Citizens Water Company and the Mountain Water Supply Company have been given to understand that the water supplied by them to the public must be pure and wholesome and to accomplish this from their sources requires the application of germicides. The Department will follow the matter up and later if necessity seems to warrant, orders will be issued to compel the water company to establish filtration works. However the decrees of the Commissioner of Health are subject to appeal to the courts and since the cost of treating all of the water drawn from the Indian Creek supply would be very considerable and since the Citizens Water Company of Scottdale would desist from any order, compelling it to build a filtration plant at this time for Scottdale, it is deemed advisable to pursue further inquiries and the collection of data.

25. TYPHOID FEVER AT DILLSBURG.

During the last half of July typhoid fever appeared in the Karns family at Dillsburg, York County, Pa., and the citizens fearing a general outbreak and wishing to have it suppressed in its infancy, called upon the Commissioner of Health for help. The public water supply was not suspected but the matter was handed over to the Engineering Division for investigation and on August 5th the Dillsburg Water Company asked for approval of its waterworks system and for permission to extend its mains. Assistant Engineer Paul Hooker made the field investigations and a report, on a basis of which the Commissioner of Health issued a decree to the water company There were a total of ten cases of typhoid fever only. The origin of the infection was not discovered. Several of the wells were found polluted.

General Conditions.

The borough of Dillsburg is situated in the northwestern part of the county within Carroll township. It has a population of 853. The municipal area is drained by two small branches of Yellow Breeches Creek, the greater part of Dodwood Run flowing northerly and entering the creek at the York-Cumberland county line just below Williams Grove. The southern part of the borough is drained by a small stream entering the creek two miles further down stream. The Dillsburg and Mechanicsburg Branch of the Cumberland Valley Railroad terminates about two miles east of the borough at an iron ore mine in Carroll Township. To the south is Washington Township, to the southeast Warrington Township and to the east is Monaghan Township. Monroe Township bounds Carroll township on the northeast and Franklin Township is to the southwest. In the following table appears the typhoid fever cases reported in these townships for the year 1910 where there was any tphoid fever and from it will appear that there were no cases in Monroe, Franklin and Monaghan Townships, but three all told in Carroll and Washington Townships for the year. Franklintown Borough in Franklin Township reported no cases for the year. There were 21 cases in Warrington Township but they mostly occurred after the Dillsburg outbreak and there is not known to have been any connection between the two.

Typhoid Fever Cases in Dillsburg and Vicinity.

Reported for 1910.

Month.	Dillsburg Borough.	Warrington Township.	Carroll Township.	Washington Township.
January,	0	0	0	0
February,	0	0	0	0
March,	0	0	0	0
April,	0	0	0	0
May,	0	0	0	0
June,	0	0	0	1
July,	5	1	2	0
August,	3	2	0	0
September,	1	10	0	0
October,	1	6	0	0
November,	0	2	0	0
December,	0	0	0	0
Totals,	10	21	2	1
Population,	853	1,538	828	1,182

Dillsburg is in a prosperous farming district. Deposits of low grade iron ore are found in various places in the vicinity. Most of these workings have been abandoned. An extensive plant for the manufacture of white brick located about a mile west of the borough has not been in operation for several years. A shirt factory with about 25 employees, a plant for the manufacture of harness and another manufacturing spokes, each with about 20 employees, a small creamery and an electric light plant are located here.

The borough has no sewers, either public or private. A number of houses, however, have modern sanitary conveniences, there being 27 baths and 28 inside closets within the borough. These all lead to percolating cesspools and there are many other cesspools for kitchen waste and wash water. In some cases there are underground streams passing through these cesspools. Privys are practically used universally. The greater part of the borough is underlaid with limestone near the surface and the cesspools are mainly in this formation. In some cases kitchen drainage is discharged into the street gutters creating foul and menacing conditions.

Water is supplied to the public by the Dillsburg Water Company which serves about 750 persons, the remainder depending upon private wells and a few upon springs. The wells are mostly in limestone formation and they are subject to pollution, being in some cases short distances from percolating cesspools.

Typhoid Fever.

There was one case of typhoid fever in the year 1909 and two in the year 1908. None were reported for the two previous years. The onsets and other data relative to the ten cases occurring during 1910 are given in the following table:

Typhoid Fever in Dillsburg, 1910.

Onset.	Patient.	Age.	Milk Supply.	Water Supply.
July 12.	Maxine Karns,	5	Own cow,	Well and public
July 12.	Mrs. Elmer Shaeffer,	37	Knisely.	Well.
July 14.	H. W. Stover,	27	Knisely.	Public and others.
July 15.	Mrs. Clarence Bushey,	26	Knisely,	Public.
July 18.	Pearl Karns,	8	Own cow,	Well and public
July 24.	Bennett Karns,	19	Own cow,	Well and public.
Aug. 1,	Robert Karns,	6	Own cow,	Well and public.
Aug. 13,	Nettie Dick,	23	Lerew,	Public.
Sept. 2.	Paul Smith,	19	Knisely.	Public
Oct. 18.	Mrs. Clarence Stambaugh,	32	Mumper,	Public

Four patients obtained their milk supply from Knisely who also supplied milk to a large number of citizens. No reason could be found why the four cases should be attributed to his milk supply as a source of infection.

The private drilled and dug wells of the town are mainly in the northern and western part of the borough where the underlying rock is limestone, and cesspools, in some cases discharging into crevices in the rock, are in general use, as also are percolating privy vaults. Underground streams flow through some of the cesspools and few, if any, ever require cleaning. Samples of water from the two wells used by typhoid fever patients and from two others in the vicinity were analyzed by the Department with the following results:

		Bacteria per c. c.	B. Coli per c. c.
July 21	Schaeffer well,	60	8
July 24	Schaeffer well,	210	0
July 26	Schaeffer well,	8	0
July 21	Schriver well,	41	3
July 26	Schriver well,	28	0
July 21	Karns well,	36	8
July 24	Karns well,	280	6
July 26	Karns well,	20	1
July 21	Ditmer well,	50	6
July 24	Ditmer well,	406	0
July 26	Ditmer well,	14	0

The following communication was addressed to the Secretary of the local Board by the Commissioner of Health:

"August 2nd, 1910.

"Charles Morris, Sec'y,
"Board of Health,
"Dillsburg, Pa.

"Dear Sir: Analyses of the samples you recently took from the Schaeffer, Schriver, Karns and Ditmer wells show the presence of sewage organisms, in each case. Owing to the geological formation, it would be difficult if not impossible to determine with any degree of certainty the sources of pollution. If possible, this should be done and the causes removed. Until the wells are rendered free from possible contamination, all water taken from them for drinking, culinary or other domestic purposes should be boiled for at least 30 minutes before using, as under present conditions the water is unsafe for human use. The danger of an outbreak of waterborne diseases among the users of these waters is very grave.

"I am to-day addressing communications to the owners of these wells warning them of the danger and cautioning them to boil the water 30 minutes before using. Proper steps should be taken to warn other persons who might use these waters.

Very truly yours,
SAMUEL G. DIXON."

The owner of each of the wells was also warned of the dangerous character of the waters in communications similar to the following:

"August 2nd, 1910.

"Mr. J. M. Karns,
"Dillsburg, Pa.

"Dear Sir:

"Analysis of the water of your well recently made by the Department shows the presence of sewage organisms. This condition renders the water unsafe for drinking, culinary or other domestic purposes unless it is boiled for at least 30 minutes. Under local conditions it would be difficult to ascertain the source of pollution, but if this can be done it would be advisable. If the source cannot be ascertained and removed, no water should be used from the well without previously boiling it, as the danger from water-borne diseases is very grave. This may have caused the illness in your family.

Yours very truly,
"SAMUEL G. DIXON."

The Karns, Schaeffer and Schriver wells were immediately closed, the pumps removed and the public water supply used exclusively. The Ditmer well was continued in service by the owner but all the water was boiled and the public warned.

The four cases in the Karns family and that of the niece who visited them frequently, Mrs. Clarence Bushey, may have been contracted from the polluted well on their property. The other polluted wells may have had something to do with the spread of the disease but there is nothing to prove how the infection started or was spread. It is not satisfactory to speculate. Had the disease been contracted by a large number of people it would perhaps be easier by process of elimination to fix more definitely these probable origin. It is a safe conclusion that the drawing of drinking water from limestone rock in proximity to cesspools and privies is attended with risk which menaces health and life. In this case at Dillsburg there were known to be flowing streams through some of the wells. Such wells for drinking purposes should be absolutely abandoned and the citizens were so notified. The public water supply being above suspicion, was recommended by the Department as pure and wholesome.

Public Water Works System.

The Dillsburg Water Company was incorporated July 18, 1901, for the purpose of "Supplying water to the public in the borough of Dillsburg and the township of Carroll, and to such persons, partnerships and associates residing therein, as may desire the same." A franchise has been granted by the borough authorities to the promoters of this company on August 3rd, 1900, permitting the laying of mains in the streets and requiring the maintenance of 15 fire hydrants and adequate pressure for fire protection.

In the year 1901 the company completed its water supply system essentially as it now exists. It is a gravity system comprising 12 enclosed springs with collecting pipes, a storage and equalizing reservoir, supply mains to the town and a distributing system.

The source of supply consists of a series of 12 springs in 5 groups along the southeastern slope of a spur of South Mountain in Franklin Township, York County, the farthest of them being about 3 miles southwest of the borough and the nearest about two miles. The watershed above the springs is wooded mountain land entirely uncultivated and without habitation. The springs emerge from a sandstone formation. Each spring is enclosed in a small concrete masonry structure from 4 to 10 feet in depth arched over at the top and entirely beneath the ground. There is no surface evidence visible. Each of the 3 farthest groups of springs comprising 7 in all, is provided with a sump, so-called, similar in construction to the spring enclosure and into these the water from the adjacent springs is conducted. These sumps are then connected into a 4 inch cast iron gravity collecting main leading along the mountain side. The two remaining groups near the town and containing two and three springs respectively are not provided with sumps but each group has a separate line leading to a collecting main. One spring of the last group is open at the top, the only one of the twelve. From this spring in addition to the outlet pipe to the supply main there is a one inch galvanized pipe leading a short distance down the hillside to a watering trough for the use of cattle belonging to the owner of the land. The pasture land does not extend as high as the springs. This spring is also available for use by the occupants of the farm a few hundred yards below, and is known as the McCormick Spring.

Originally the gravity collecting main was composed of vitrified pipe as were also the short feed lines from the springs but this has been gradually replaced by cast iron pipe until only the feed pipe leading to one group of springs remains of tile and it is the intention to replace this at an early date. The collecting main delivers the water into an 8 inch gravity main leading from the reservoir, the junction being close to the latter.

The reservoir is a masonry structure located on the mountain side about 1-12 miles southwest of the borough and approximately 140 feet above its highest part and has a capacity of 570,000 gallons. It is elliptical in shape, 70 feet wide and 90 feet long approximately and 20 feet deep. Its capacity was increased to the present amount about 7 years ago by raising the sides 18 inches, thus adding some 70,000 gallons to the storage. The 8 inch cast iron gravity main to the town leads from the one side extending perhaps 50 feet down the hillside to its junction with the 4 inch gravity collecting main. Both pipes have valves so that either may be cut off from the distributing system. Normally the water from the springs backs up into the reservoir and the surplus overflows through a waste pipe near the surface discharging into a sump at the foot of the embankment and thence down the hillside. Usually a considerable amount of water is thus continually wasted. Between the reservoir and the connection with the collecting main, above the 8 inch valve controlling the reservoir outlet, there is a valved blow-off on the outlet main from which a pipe leads to the sump above mentioned. The reservoir may thus be drained and cleaned without interfering with the service. On the gravity main leading to the borough, there are two blow-offs at low points and outside the borough limits there are also a one inch galvanized and a 3 inch cast iron connection supplying respectively a farm house and a brick yard. This farm house is in Franklin Township and the brick yard in Carroll Township. The latter, however, has not been in operation for several years.

The 8-inch gravity supply main extends about 1000 feet from the reservoir toward the town where it reduces to 6 inches for the remainder of the distance. It is laid through private property throughout to a point on Hartman Street just west of the borough line. Thence it follows Hartman Street 6 inches in iameter to Second Street where there is a valved connection with the distributing system. The distributing mains are 6 inches and 4 inches in diameter and are laid in practically all of the occupied streets, supplying 20 fire hydrants. There are at present 5 dead ends, three of which have hydrants which may be used for blowing off and the others have special blow-offs. There is also a 2-inch blow-off at a low point near the corner of Chestnut and York Streets. There has been some complaint indicating that the hydrant blow-offs have not been made use of sufficiently often.

The water company on August 5th made application for permission to extend its distributing mains throughout the borough and asked for approval of its system and sources of supply.

The estimated consumption of water supplied by the company is reported to be 50,000 gallons daily, of which about 40,000 gallons are used for domestic purposes. The normal yield of the sources of supply is not known, but they are probably capable of delivering twice as much water as is now consumed.

The system has been tested in practice and has been found to meet any probable demands put upon it for fire protection without seriously interfering with the domestic service. The pressure in the town varies from 65 pounds at the highest point to 110 pounds at the lowest, the average pressure being 85 pounds.

The Department collected samples and analyzed the water of the public supply with the following results:

Analyses of the Public Water

1910

Data of collection.	Location.	Bacteria per c. c.	
		Total.	B. Coli.
July 24,	McCormick spring,	74	0
July 24,	Reservoir,	18	0
July 21,	Tap at Clark residence,	6	0
July 26,	Tap at Clark residence,	2	0
July 21,	Tap at Stover residence,	6	0
July 20,	Tap of Stover residence	3	0

Before the close of the year the Commissioner of Health issued a permit to the Dillsburg Water Company to extend its waterworks system and approving the sources of supply. The following are excerpts from this permit:

"From physical and bacteriological evidence the water supplied by the Dillsburg Water Company appears to be of an exceptionally good quality and with reasonable care this character can be maintained. The springs and collecting mains are well protected against pollution with the exception of the McCormick spring. This should be covered securely, protected from surface drainage and kept under lock and key so as to be accessible only for observation and repairs. However, as appears probable, if it is necessary that the occupants of the nearby farm obtain water by dipping from this spring, then it should certainly be abandoned as a source of public supply and cut off entirely from the system. This can doubtless be done without materially reducing the available supply as is shown by the surplus continually going to waste at the reservoir. There is always danger of contamination of a spring which is accessible to passersby or from which water is dipped by hand and the person so contaminating the water may be in the early stages or just recovering from an infectious disease, in which case an epidemic among the consumers of the water may result. Care should be taken to prevent access of cattle to the area above any or all of the springs. It appears possible that this might occur at the McCormick spring and others in this vicinity. The spring which has been added to the source of supply and for which approval is now asked is virtually a means of intercepting the excess water from a neighboring spring already used.

"Detail drawings have not been submitted showing the construction at the springs and the sumps, to which the water from some of the springs is delivered before entering the collecting main. The plans submitted show the reservoir in general, outlets and the relative location of the valves and blowoffs. This is not sufficient. There should be on file with the Department detailed drawings showing the reservoir in plan and section and details of the outlet overflow and other appurtenances. The reservoir should be fenced in and rendered inaccessible to any but authorized persons, in order to prevent accidental or malicious pollution of the water.

"The extension of the service to all of the inhabitants of the borough and the abandonment of the wells and springs now in use is clearly in the interest of public health. The extensions which have been made and those proposed are highly desirable. The elimination of dead ends should be brought about at the earliest practicable date. Meanwhile all dead ends should be blown off at least once a month. The reservoir should be emptied and cleaned twice during each year, at least.

"It does not appear from the evidence at hand that in making the few minor extensions which have been put in since the passage of the Act of 1905, the water company intentionally ignored the provisions of that law. It is represented that in filing a plan of its system and report thereon, the water company officials supposed that they were doing all that was necessary. Upon their attention being called to the contrary fact, they immediately made application to the Commissioner of Health for a permit."

The permit was issued subject to the following conditions and stipulations:

"First—On or before July 1st, 1911, the water company shall prepare and file with the Commissioner of Health, detailed plans showing the construction of the spring enclosures and of the reservoir, showing overflows, outlets, valves and all appurtenances.

"Second—The water company may extend its distributing system from time to time as occasion demands but at the close of each season's work shall file with the Commissioner of Health plans showing all the extensions made during that year so that the Commissioner of Health may at all times be fully informed of the extent and use of the system.

"Third.—The water company shall immediately take the necessary steps to protect the source of supply from possible contamination. The necessary barriers shall be erected to prevent access of cattle to the area above the springs. A suitable fence shall be erected to effectually prevent access to the reservoir except by persons authorized to make inspections and repairs. The so-called McCormick spring shall either be securely covered and access to the same be prevented except by authorized persons and then only for the purpose of inspection and repairs or the spring shall be abandoned as a source of supply to the public and all connection with the collecting system to be severed.

"Fourth—If at any time in the opinion of the Commissioner of Health the water works system or any part thereof shall become prejudical to public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest."

26. TYPHOID FEVER AT COKEBURG.

On June 9th, 1910 at the Department's laboratory a sample of water from Cokeburg spring, sent by Dr. R. J. Kirby was analyzed and found to be polluted with sewage. A report of the analysis was made to Dr. Kirby on June 16th. Up to June 1st, 27 cases of typhoid fever had been reported from the borough, 17 of which occurred during the month of May. But 4 cases were reported for June, on the 3rd of August the returns for the month of July showed 22 additional cases. At once the Commissioner of Health notified Dr. C. B. Wood, County Medical Inspector for Washington county to investigate the typhoid outbreak at Cokeburg. On the 4th of August Dr. Wood reported to the Commissioner of Health as follows::

"Your telegram message to investigate outbreak of typhoid fever at Cokeburg received today and I at once went to Cokeburg.

"Dr. Kirby informed me that about ten or twelve cases developed ten weeks ago, of these three were fatal. Then there was a let up, no new cases appearing, until twelve days ago new cases rapidly appeared, and now he has about twenty cases under his care. All these people are foreigners, and live in the Ellsworth Coal Co. houses.

"About twenty-five houses in each of two rows, situate on a hill side. Below the houses are the outside water closets. Plant vaults. Below the closets, at the foot of the hill, two hundred feet distant is a spring, the source of drinking water supply for the people. This spring, no doubt is the source of the infection.

"Dr. Kirby ordered the people not to use the spring water, and the company officials have repeatedly destroyed it in a way by taking away the pipes, but the people will again gather the water with any sort of pipe obtainable.

"Dr. Kirby also has urged the boiling of all water used for drinking. There is also a hydrant water supply but the water is unfit for drinking, coming as it does from Pigeon creek.

"The Company has a number of drilled wells near these houses, but the wells are deep and hard to pump, consequently the people will go to the spring.

"The Cokeburg Board of Health is inactive, having no President elect. I called on the Secretary, however, Mr. Joseph Algire of Cokeburg, and urged him to call a meeting at once, advising the total destruction of the spring, cleaning of all vaults, and complete disinfection of the same. He agreed to act but did not manifest much interest. I would advise a Department letter to him, and also one to Mr. Luce, General Mgr., of Ellsworth Coal Co., Ellsworth, Pa.

"I may add that all drainage from this village flows directly into Pigeon Creek, and that a number of mining villages and towns are located on Pigeon Creek, below Cokeburg.

"Awaiting your further instruction, I remain."

The Commissioner of Health sent a letter to the local Board of Health outlining to them how to wage a campaign against the disease.

The matter of cleaning up the borough was handed over to the Engineeing Division and on August 6th Inspector Roy M. Souder arrived in the borough and began operations. The following is a report of the work.

General Conditions.

The borough of Cokeburg was incorporated in 1906 out of a part of Somerset township and a part of West Bethlehem township, Washington county. It has a population of 1,300 and is a coal mining and coke community of the Ellsworth Branch of the Monogahela Division of the Pennsylvania railroad about 15 miles from Monongahela City. The borough territory comprising about 165 acres and is owned by the Ellsworth Colleries Company of Ellsworth. There is no private property in the town, all of the buildings belonging to the company. It is located at the junction of Three and Four Run and the South Branch of Pigeon Creek. Two miles below is the borough of Ellsworth, population 2,100, and adjoining Ellsworth down stream is Bentleyville, population

1,900. Cokeburg is located on two ridges running north and south. Most of the properties are on the east ridge. Between these ridges is a valley about 600 feet wide. Naturally the drainage is into Three and Four Run but the outlet is practically closed up by a large mine refuse dump, locally called 'Gob.' Most of the drainage from the dwellings on the hillside is into this valley. On August 6th owing to this dam there was quite a pool of stagnant water in the valley.

There are 23 drilled wells ranging from 80 feet to 200 feet and cased to rock in the usual manner located in the streets in convenient places about the town. They were provided to furnish drinking water.

There are two springs in the valley between the ridges, one is located about 250 feet distant from dwelling No. 134. This spring is not protected in any way from surface drainage, it is what may be considered a well defined wet weather ditch leading from the east ridge where about all of the cases of typhoid fever have occurred. That the head of this ditch there was a plank privy vault overflowing into the ditch and within 50 feet were several other overflowing privies from which in time of rain excrement would be washed into the ditch and thence into the spring. All of the waste waters from half the dwellings on the east ridge would be washed toward the springs and much of it would get into the spring.

The other spring is located at the foot of the east bank of the 'Gob' dump, and down the valley about 200 feet from the first mentioned spring. The latter is covered and has a pump attachment. On August 6th no water was in this well and it was not being used.

For the coal and coke operation the company maintains a system of water works and mains have been extended through the town and hydrants in the streets at convenient places have been connected for the use of the tenants. This water is intended only for washing purposes. Inquiry revealed the fact that no one used this water for drinking purposes if reports can be accepted as reliable. This industrial supply is derived from two reservoirs. One reservoir is formed by a dam across Pigeon Creek. This structure is about ¼ of a mile above the junction of the creek and the run. Its storage capacity is reported to be 11 million gallons. From the pumping station at the dam an 8 inch rising main extends to the village and power plant of the company. From this point a 6 inch line extends up the streets on the east ridge to the top terminating in two steel tanks capacity 50 thousand gallons. From this line hydrant connections are extended.

The other reservoir is formed by a dam on the run just beyond the village. It has a reported capacity of 12 million gallons, from it there is an 8 inch main extending into the town.

The run reservoir drains a precipitious watershed to the west of about 1 square mile wholly in West Bethlehem township, and a part of the village of Scenery Hill lying at the summit of this area. There are in this village 24 houses and about 1-3 of them are reported as draining to the run mentioned. The Department made a sanitary survey of the watershed in May 1910. Outside of the village there are 5 properties only on the area. In the village there were 5 cases of typhoid fever during the summer and fall. Two of them had their onset on August 18th, one in October, another on October 15 and the other on November 4th. There was only one polluting property found and this was the Gerlein Hotel where two cases of typhoid fever occurred, viz: one on August 18 and the other October 7th. The pollution was abated during June.

The creek reservoir has a watershed to the north about 4 miles long and 2 miles wide. One fourth of it lies in Somerset township and the balance of it in West Bethlehem township. The area is very rugged and sparsely populated. On the watershed there were 60 occupied estates inspected by officers of the Department during the fall of 1909 and spring of 1910. At the conclusion of the year there were 9 pollutions remaining unabated.

On the watershed there were two cases of typhoid fever both occurring on polluting properties, one was in May 1910 and the other in December.

During the typhoid fever outbreak there were 78 cases reported from Cokeburg borough for the year 1910, 13 in West Bethlehem township and 4 in Somerset township. In Ellsworth borough there were 21 cases for the year and in Bentleyville borough 34 making a total in this district of 150 cases.

The case on the creek watershed on May 16th could not have caused the 27 cases reported for Cokeburg borough up to June 1st, and there were but

4 cases reported during June. Because the typhoid fever in the borough was confined to one district while the hydrant water was available in all parts of the borough it was not believed that the public water supply was the medium of transmission. The first case on the run watershed of August 18th anti-dated the outbreak and the second case on this watershed of October 7th occurred after the epidemic had passed the borough. It is not known that there is any connection between the typhoid in Bentleyville and Ellsworth boroughs and that in Cokeburg or the two townships.

Typhoid Fever Reported From Cokeburg and Vicinity, 1910.

Month.	Boroughs.			Townships.		
	Cokeburg.	Ellsworth.	Bentleyville.	W. Bethlehem.	Somerst.	Total.
January,	0	0	3	0	0	3
February,	1	2	0	0	0	3
March,	7	0	1	0	0	8
April,	2	0	0	0	0	2
May,	17	2	0	0	1	20
June,	4	0	1	0	0	5
July,	22	0	0	0	0	22
August,	14	7	14	5	0	40
September,	6	8	2	0	1	17
October,	5	0	11	3	1	20
November,	0	0	1	3	0	4
December,	0	2	1	2	1	6
	78	21	34	13	4	150

Cause of Outbreak.

All of the patients drank water from the two springs hereinbefore mentioned and chiefly from the spring that was not protected, the one opposite property No. 134. None of the houses were placarded. Dr. H. J. Kirby attended the majority of the cases.

Inspector Souder found the Cokeburg spring pipe through which the water ran taken out. The dam had been removed and the water cannot be used again unless it be dammed up so that the citizens can dip the water with buckets. The Superintendent of the Company placed guards at the spring to prevent the people from using the water. He also had a lock put on the pump at the other spring. He was ordered to remove the pump and fill the spring.

Privy vaults on August 6th were overflowing and exposed to flies. No attempt has been made to clean out the vaults since the fall of last year. Mr. Souder advised the Superintendent to enclose all of the vaults and to dig ditches to divert surface drainage.

The medium of transmission of the infection seems without doubt to be the Cokeburg spring and the insanitary habits of the people which were not calculated to prevent secondary infection.

In the following table is given the results of the samples of water collected by Mr. Souder:

Water Analyses 1910.

Date of Collection.	Sample.	Bacteria per c. c.	
		Total.	B. Coli.
Aug. 8	Cokeburg spring,	43,200	75
Aug. 8	Cokeburg spring,	43,400	800
Aug. 8	Drilled well property No. 156,	100	0
Aug. 8	Hydrant water property No. 156,	600	0
Aug. 8	Drilled well property No. 146,	1,300	0
Aug. 8	Drilled well property No. 136,	14,700	0
Aug. 8	Spring at Slate dump,	2,100	0

Conclusions.

Here was an instance of where a borough government barring the citizens living on territory and in dwellings owned by a private corporation and being employed wholly and dependent upon said corporation, amounted to nothing when it came to protecting the health of the community and preventing an epidemic due to insanitary practice. There was a local board of health in name but as a practical board it proved useless. The responsibility for the conditions leading up to the outbreak lay with the private corporation for the people were helpless to care for themselves. They did not own the water works nor the houses and they were not accustomed to pay any attention to duties developing upon them in the maintenance of a municipal form of government so far as taking care of the public health is concerned. The citizens looked upon the company as the great father who would provide them with water and other things. Wells had been drilled by the company, but it was not convenient to operate the pumps. The privy vaults were negligently maintained. Such was their ignorance of sanitation and consequences of drinking a sewage polluted water, that the desultory efforts of the company did not keep the citizens from drinking the Cokeburg spring supply. There should have been an absolute abandonment of the spring regardless of the storm of protest which such a course would have caused among the inhabitants. It is believed that the lesson has been a profitable though sorry experience for Cokeburg and that in the future proper care will be taken in matters pertaining to the preservation of the public health.

27. TYPHOID FEVER IN THE WYOMING VALLEY.

In the latter part of the summer typhoid fever appeared simultaneously in a chain of municipalities in the Wyoming Valley. The public particularly the citizens of Wilkes-Barre, becoming alarmed, and believing that a widespread epidemic was imminent, solicited the efforts of the Commissioner of Health to stamp out the infection. The public supply was suspected. For many miles along the mountains on either side of the valley all of the available sources of water supply were under the control of a single operating water company, one of the most extensive and complicated if not the most complicated system in Pennsylvania. The work of investigation and supervision of the incipient epidemic could not be handled efficiently and economically at Harrisburg. Therefore, the Commissioner of Health sent the Chief Engineer with a large corps of assistants into the field to make an investigation and execute the necessary orders. The following is a complete report of the Department's operations. The field force comprised, besides the Chief Engineer, the following:

Assistant Engineer, Paul Hooker.
Assistant Engineer, Ralph E. Irwin.

Assistant Engineer, M. E. Shaughnessy.
Stenographer, Daniel V. Ness.
Clerk, Howard M. Haines.
Chief Sanitary Inspector, Moses K. Ely.

Sanitary Inspectors—
 Harry C. Beckley,
 Andrew W. Conrad,
 M. Z. Frederick,
 Jos. M. Hellings,
 Wm. R. Teats,
 T. W. Templeton,
 Ira Zeigler,
 Wm. H. Kauffman,
 H. A. Miller,
 Thomas R. Nickolson,
 J. H. Silliman.

The work met with the commendation of the united press of the valley.

Page.

Introduction 1084
PART 1—THE WATER WORKS SYSTEM 1085
1. Spring Brook Supply 1089
 Round Hole Reservoir 1090
 Quality of Spring Brook Water 1090
 Trout and Monument Brooks 1091
 Distribution Spring Brook Water 1091
 Little Mill Creek—Auxiliary Supply 1092
 West Pittston Pumping Station 1092
 Quality of Susquehanna River Water 1092
2. Covey Reservoir Supply 1094
3. Falling Spring Supply 1095
4. Wilkes-Barre Mountain Supply 1096
 Laurel Run Reservoirs 1096
 Mill Creek Reservoirs 1099
 Gardners Creek Reservoir 1102
5. Crystal Lake and Pine Run Supply 1102
 Pine Run Reservoir and Intake No. 6. 1103
 Solomons Creek Intakes 1103
 Crystal Lake and Filter 1103
 Empire Reservoir 1105
 Laurel Run Borough High Service System 1105
 Richard's Island Pumping Service 1105
 Distributing Districts and Quality of Water 1106
6. Toby Creek Supply 1107
 Distribution 1108
 High Service Districts 1109
 Population 1109
 Quality of Water 1109
7. Coal Creek Supply 1110
 Harvey's Creek Supply 1111
 Little Wilkes-Barre Mountain Supply 1113
 Sugar Notch Reservoir and Intake 1113
 Hanover Reservoir and Intake 1113
 Wanamie Reservoir and Intake 1113

PART 11—THE DISTRIBUTION OF TYPHOID CASES IN THE WYOMING VALLEY, SEASON OF 1910, AND ITS RELATION TO THE PUBLIC WATER SUPPLY 1114

1. In General 1114
2. Wilkes-Barre Mountain System 1117
3. In Crystal Lake and Pine Run System 1119
4. In Toby and Coal Creek System 1119
5. Review of Distribution of Cases in Wyoming Valley 1120
6. Recapitulation 1126

PART III—INTERMEDIATE MEASURES TAKEN FOR THE PROTECTION OF THE SOURCES OF PUBLIC WATER SUPPLY ..... Page 1127

1. At West Pittston Pumping Station 1127
2. Analyses of Spring Brook Water 1127
3. At Laurel Run Reservoir and Pine Run Dam 1128
4. Anaylses of Wilkes-Barre Mountain Supply 1129
5. Relative to Toby Creek Supply 1129
6. Relative to the Harvey's Creek Supply 1130
    a.—Analyses 1130
    b.—Oneonta Hotel Water and Sewerage System, Harveys Lake 1131
    c.—Railway Picnic Ground Water Supply, Harveys Lake 1131
    d.—At Harveys Lake in General 1132
7. At Little Wilkes-Barre Mountain Supply 1133
8. Anaylses of Richard's Island Ground Water 1134
9. General Warnings and Sanitary Survey of Water Sheds 1134

PART IV—CAUSES OF TYPHOID FEVER IN WILKES-BARRE AND VICINITY AND MEASURES TAKEN TO SUPPRESS THE OUTBREAK 1135

1. Milk Infection 1135
    a—Table—Milk Dealers and Sources of Supply (Who had Typhoid Cases on their Routes) 1135
    b—Rineman Brothers Milk 1136
    c—Thoma Milk (Vosburg Creamery) 1142
        Dealers Supplied by Thoma (Table) 1143
        Producers of Milk Supplied to Vosburg Creamery (Table) . 1145

Dealers—

George H. Sheehan 1147
Robt. L. Leonard, ... 1148
Peter Brown 1149
Henry Miller 1150
Keystone Dairy 1151
Miscellaneous customers of Thoma Milk 1152
d—Sources of Milk Supply to the City of Wilkes-Barre 1156

Explanation 1156
Major Sources 1157
Creameries investigated by the State (Table) 1157
    Centre Moreland Creamery Company 1157
    Meshoppen Creamery 1158
    New Era Creamery Co 1159
    Lake View Sub-station 1159
    Shannon Hill Creamery 1160
    Standing Stone Creamery 1161
    Wyalusing Creamery Co. Ltd., (Vosburg Creamery) 1161
    Minor Sources 1167

e—Relation of General Milk Supply to Typhoid Fever in the city (Exclusive to Rineman and Thoma Milk) 1167

    Ten Principal Dealers (Table) 1168
    Farmers' Dairy Co 1168
    Standard Dairy Co 1170
    Richard Clink, Dealer 1171
    George Newcomb, Dealer 1172
    Mrs. Goodstein, Dealer 1173
    Hillside Dairy 1173
    Charles Kresge, Dealer 1174
    William H. Snyder, Dealer 1174
    J. B. Loomis, Dealer 1174
    J. F. Schmoll, Dealer 1175
    Twenty-two miscellaneous Dealers 1176

PART IV—Continued. Page.

f—Summarized Statement of Milk Infection Cases 1181
g—Precautions Taken Relative to Milk Supply 1181

2. Miscellaneous Infection 1185

a—Tyhoid Fever of Secondary Origin 1185
b—Imported Tyhoid Fever Cases 1189
c—Typhoid Fever Infection due to Water and the Examination of Spring and Bottled Water, ... 1190
Explanation 1190
Typhoid Fever due to boating, bathing and washing in river 1190
Typhoid Fever due to Vulcan Spring 1192
Examination of Spring and Bottled Waters 1194
1. Blue Rock Water 1195
2. Diamond Spring Water 1197
3. Evans Farm Water 1197
4. Fairview Spring Water 1198
5. Glen Summit Water 1198
6. Hydrox Water 1199
7. Oostanala Spring Water 1201
8. Pocono Mineral Spring Water 1201
9. Shawnee Water 1203
10. Becker Artesian Water 1204
Examination of Private Wells 1207
Examination of the Ice Supply 1208
1. Wilkes-Barre Cold Storage & Artificial Ice Company 1208
2. Fenner, John W. 1208
3. Ganoga Ice Company 1208
4. Heart Lake Ice Company 1208
5. Mountain Lake Ice Company 1208
6. Mountain Ice Company 1208
7. Pocono Ice Company 1208
8. Spring Lake Ice Company 1208
d—Typhoid Fever of Obscure and Unknown Origin 1209
Garbage and Night Soil Disposal 1209
Cases not Typhoid Fever 1209
3. Summary of City Typhoid Cases 1211

PART V—TYPHOID FEVER IN WYOMING VALLEY AND MEASURES TO SUPPRESS THE SAME 1212

1. Distribution of Typhoid Fever Cases by Municipalities in the Wyoming Valley, excluding Wilkes-Barre 1212

2. Order—"To the Local Authorities of the Municipalities in Wyoming Valley 1214

PART VI—CONCLUSIONS 1220

REPORT OF
WYOMING VALLEY TYPHOID FEVER OUTBREAK.
SUMMER OF 1910.

Introduction.

On August 3rd, 1910, Mr. Fred H. Gates, City Clerk of Wilkes-Barre, addressed the following letter to the Commissioner of Health of the State of Pennsylvania relative to any suggestions the Department might have to make about the handling of the typhoid fever situation in the city:

"I have been directed by Mr. Edwin R. Morgan, Chairman of the Sanitary Committee of City Councils of this city to inform you that 41 cases of typhoid fever have been reported to his Department since the 12th day of July. That 12 of these cases are from outside of the city limits but at our hospitals in the city. That he is very desirous of knowing whether or not your Department has any suggestions to make with reference to handling the situation. That his Department stands ready and willing to take any action in the matter as may be directed by you. He thought best to advise you of the exact standing of the matter at the present time."

This letter was followed by telegrams on the 4th and 5th of August. The Commissioner of Health by way of co-operation is running down the source of infection and excluding any dangerous supplies of milk or food stuffs, first instructed Dr. C. H. Miner, County Medical Inspector for Luzerne County, to keep in close touch with the City Officers. Later the work increasing, the Chief Engineer of the Department, F. Herbert Snow, and a corps of assistants were sent to Wilkes-Barre to investigate and report conditions and to execute the orders which the Commissioner of Health might give.

Typhoid Fever Records in Wilkes-Barre.

The following is a list of typhoid fever cases and deaths in the city of Wilkes-Barre during the last eight years, compiled by the City Clerk.

Cases.

	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	Average.
January,	3	4	3	3	7	19	7	4	6.2
February,	8	4	3	1	7	8	6	4	3.9
March,	1	7	1	0	4	4	3	1	2.6
April,	0	0	2	2	5	4	5	1	2.4
May,	3	3	2	6	3	1	2	1	2.6
June,	1	2	2	1	4	4	0	2	2.0
July,	3	10	0	6	8	7	8	8	6.2
August,	11	3	3	3	13	14	27	7	10.1
September,	6	5	3	8	9	16	14	10	8.9
October,	0	1	9	12	11	9	21	5	8.6
November,	2	15	1	16	6	8	4	5	7.2
December,	2	7	0	8	3	6	4	3	4.1
Total	35	61	29	66	80	95	101	51	

Deaths From Typhoid Fever in the City for the Last Ten Years.

Year.	Deaths
1900,	16
1901,	18
1902,	6
1903,	14
1904,	11
1905,	8
1906,	18
1907,	26
1908,	15
1909,	10

The cases and deaths given in the table include those registered at the hospitals and should, therefore, not be taken as representative of the extent of typhoid fever in the city only. since Wyoming Valley contributes to the hospitals. The months of January, July, August, September, October and November have recorded typhoid fever in excess of the average for the year. August, September, October and November have been the typhoid fever months the country over. The disease has been known for years as "Vacation Typhoid." The increase comes regularly upon the exit to or return from the country, sea-shore and mountains of the summer vacationists. It has been also referred to as "Autumnal Typhoid." The increase begins about the first of August and extends into November.

No city or large community is ever entirely free from the disease. Sanatarians have fought it by the establishment of sanitary regulations and the enforcement of precautionary measures. In the towns where intelligence and faithfulness characterize the efforts of the officials, the typhoid death rate has been reduced. In the country, however, the individual is left to his own discretion or indiscretion, and the consequence of his carelessness may reach the city people through the public water supply or milk or other food supply. When the hordes of vacationists go from the city to the country the danger of infection increases by bounds. The city water supply is usually from one source and therefore may be more easily protected from contamination, but in the country at the cottages or camps, gross negligence oftimes prevails with respect to sanitary precautions. The closet drains to some run or the soil becomes contaminated with sewage and pollutes a nearby spring or well used for drinking purposes. Lakes and flowing streams are polluted and the infection brought from the city is disseminated and spread among unsuspecting victims. Resort to the farms and wells, and interchange of utensils or contact at the dairy has been known to pollute drinking water and ultimately the milk supply and through this medium the infection is carried back to the town. During the last ten years 54 per cent. of the typhoid fever in Wilkes-Barre has occurred during the four months, from August to November inclusive. So insidious is the attack of the typhoid bacilli that the individual attacked may carry about the germs and distribute them without knowing the seriousness of his condition. The germ is able to live and propagate for years in the gall-bladder and elsewhere in persons who show no signs of illness and they may spread the infection among those with whom they come in contact. Fingers, water, milk, flies, house-hold utensils and dust are the chief media of transmission. Fortunately typhoid fever can be prevented if proper care be taken in the disposal of excreta.

PART I.

The Water Works System.

Before taking up the distribution of the typhoid fever cases for the summer of 1910, in the city of Wilkes-Barre, in their relation to the public water supply, it is essential to have a knowledge of the various sources of this supply and the districts exclusively furnished with water from particular sources. The system is so extensive and complicated that any description must necessarily be lengthly.

The city of Wilkes-Barre, County seat of Luzerne county, is located in the centre of the Wyoming Valley on the banks of the Susquehanna River in the heart of the richest anthracite coal fields of Pennsylvania. The population is 67,105 and within a radius of 10 miles it is 200,000. There are three cities, 28 boroughs, 6 townships of the first class and 4 townships of the second class in the Wyoming Valley. Their population are given in the following table:

No. of town.	Miles below Scranton.	Charter Territory. Town and Classification.	Population.	Name of Water Company.	Date of Incorporation.	Class.	No. of Company.
		Lackawanna County.					
1	0	Scranton city,	129,867	Peoples W. Co. of Scranton,	June 14, 1889,	Active,	1
	0	Bellevue now in city; formerly in Lack. Tp.,		Bellevue W. Co.,	Oct. 18, 1888,	Active,	2
2	1.5	Lackawanna Tp., 1st class, Minooka village,	4,500	Minooka W. Co.,	Oct. 1, 1888,	Active,	3
3	2	Taylor boro; formerly Taylorville village,	9,061	Taylorville W. Co.,	Oct. 26, 1886,	Active,	4
4	3.5	Old Forge boro; formerly Rendham village,	11,326	Rendham W. Co.,	Oct. 18, 1888,	Active,	5
		Old Forge boro,		Old Forge Boro W. Co.,	July 16, 1901,	Active,	6
5	4	Moosic boro; formerly Moosic village in Lack. Tp.,	3,963	Moosic W. Co.,	June 22, 1886,	Active,	7
		Moosic boro,		Central Colliery W. Co.,	July 16, 1901,	Active,	8
		Luzerne County.					
6	5	Avoca boro; formerly Pleasant Valley boro,	4,634	Spring Brook W. Co.,	July 25, 1884,	Active,	9
		Avoca boro,		Avoca Boro W. Co.,	July 16, 1901,	Active,	10
7	6	Duryea boro; formerly Marcy Tp.,	7,484	Valley W. Co.,	July 6, 1889,	Active,	11
		Duryea boro; formerly Marcy Tp.,		Marcy Twp. W. Co.,	July 16, 1901,	Active,	12
8	7	Hughestown boro,	2,024	Hughestown Boro W. Co.,	July 16, 1901,	Active,	13
9	8	Pittston City; formerly Pittston boro,	16,262	Pittston W. Co.,	May 4, 1852,	Lapsed,	14
		Pittston City; formerly Pittston boro,		Peoples W. Co. of Pittston,	July 15, 1889,	Active,	15
		Pittston City,		Pittston City W. Co.,	July 16, 1901,	Active,	16
10	8	Pittston Tp., second class,	7,033	Pittston Twp. W. Co.,	July 16, 1901,	Active,	17
11	8	West Pittston boro,	6,848	West Pittston W. Co. (Merged with Pittston W. Co.)	April 12, 1877,	Lapsed,	18
		West Pittston boro,		West Side W. Co.,	July 6, 1889,	Active,	19
12	9	Exeter boro,	3,537	Being supplied by Spring Brook Water Supply Co.			
13	9	Yatesville boro,	500	Yatesville Boro W. Co.,	July 16, 1901,	Active,	20
14	10	Laflin boro,	300	Laflin Water Co.,	April 29, 1889,	Active,	21
15	10	Jenkins Tp., second class,	5,000	Jenkins Twp. W. Co.,	July 16, 1901,	Active,	22

No. of town.	Miles below Scranton.	Charter Territory, Town and Classification.	Population.	Name of Water Company.	Date of Incorporation.	Class.	No. of Company.
16	10	Wyoming boro,	3,010	Wyoming W. Co.,	July 6, 1889,	Active,	23
17	10	West Wyoming boro, incorporated from Wyoming,	1,621	Wyoming W. Co.,	July 6, 1889,	Active,	
18	13	Forty Fort boro,	2,[illegible]	Forty Fort W. Co.,	June 1, 1891,	Active,	24
19	13	Kingston Tp., 2nd class, (No people now supplied),	1,049	Clear Brook W. Co.,	Sept. [illegible], 1889,	Active,	25
20	13	Swoyerville boro—out of Kingston Tp.,	3,648	Clear Brook W. Co.,	Sept. [illegible], 1882,	Active,	
21	13	Plains Tp., 1st class,	10,529	Plains Twp. W. Co.,	July 16, 1891,	Active,	26
		Plains Tp., 1st class,		Plainsville W. Co.,	May 20, 1890,	Active,	27
22	13	Miners Mills boro,	3,159	Miners Mills W. Co.,	Dec. 23, 1890,	Active,	28
23	11	Parsons boro,	2,587	Parsons W. Co.,	Dec. 22, 1890,	Active,	29
24	15	Wilkes-Barre City; formerly Wilkes-Barre boro,	67,105	Wilkes-Barre W. Co.,	Feb. 12, 1870,	Active,	30
		Wilkes-Barre City,		Peoples' W. Co.,	May 19, 1891,	Active,	31
25	15	Wilkes-Barre Tp., 1st class,	5,702	Crystal Spring W. Co.,	July 16, 1866,	Active.	32
26	15	Laurel Run boro,	790				
27	15	Dorranceton boro,	4,046	West Side W. Co.,	April 13, 1888,	Active,	33
		Dorranceton boro,		Citizens W. Co.,	July 6, 1889,	Active,	36
28	15	Kingston boro,	6,449	Kingston W. Co.,	Sept. 3, 1889,	Active,	34
		Kingston boro,		Mountain Brook W. Co.,	May 16, 1863,	Lapsed,	35
29	15	Luzerne boro,	5,426	Luzerne W. Co.,	July 6, 1889,	Active,	37
		Luzerne boro,		Tobys Creek W. Co.,	Dec. 23, 1890,	Active,	38
30	15	Edwardsville boro,	7,130	Edwardsville W. Co.,	Sept. [illegible], 1889,	Active,	39
		Edwardsville boro,		Kingston W. Co.,	Mar. 8, 1865,	Active,	40
31	15	Pringle Tp., 2nd class—from Kingston Tp.,	1,900	Clear Brook W. Co.,	*Sept. 3, 1889,	Active,	
32	15	Courtdale boro, out of Kingston Tp.,	1,423	Clear Brook W. Co.,	*Sept. 3, 1889,	Active,	
33	16	Larksville boro—out of Plymouth Tp.,	9,288	Plymouth W. Co.,	June 13, 1855,	Active,	41
34	18	Plymouth Tp., first class,	3,371	Plymouth W. Co.,	June 12, 1875,	Active,	
35	18	Plymouth boro,	16,995	Plymouth W. Co.,	June 12, 1875,	Active,	
		Plymouth boro,		Shawnee W. Co.,	July 6, 1889,	Active,	42
36	18	Hanover Tp., 1st class,	6,964	Hanover W. Co.,	Oct. 5, 1885,	Active,	43
37	17	Ashley boro, inc. Aug., 1871, from Hanover Tp.,	5,601	Being supplied by Crystal Spring W. Co.,			

---

*See Kingston Township.

38	13	Sugar Notch boro, inc. Apr., 1867, from Hanover Tp.,	2,437	Being supplied by Hanover W. Co.,			
39	19	Warrior Run boro, inc. May, 1895, from Sugar Notch boro,	1,251	Being supplied by Hanover W. Co.,			
40	21	Nanticoke boro,	18,877	Nanticoke W. Co.,	May 25, 1882,	Active,	44
41	25	Newport Tp., first class,	10,277	Being supplied by the Nanticoke W. Co.,			
------	------	Valley of Wyoming, Luzerne County,	----------	Harvey's Lake Water Supply Co.,	Feb. 11, 1896,	Active,	45
------	------	County of Luzerne,	----------	North Mountain Water Supply Co.,	Aug. 16, 1897,	Active,	46
------	------	District composed of Luzerne and Lackawanna Counties,	----------	Spring Brook Water Supply Co.,	Mar. 2, 1896,	Active,	47

Wyoming Valley, for the purpose of this report, is considered to be all the land included between parallel ranges of mountains whose summits are about 5 miles apart, extending from the city of Scranton, in Lackawanna county, 15 miles northeasterly of Wilkes-Barre, to the lower end of Newport township, in Luzerne county, 12 miles southwesterly of Wilkes-Barre. The Susquehanna River flows through a gap in the westerly range, at the Lackawanna county line and pursues a general southwesterly course, and along its banks and in the valley are located the various municipalities of Luzerne county. At Pittston City 7 miles above Wilkes-Barre, is the mouth of the Lackawanna River, which drains, what is considered for the purpose of this report, the Upper Wyoming Valley to Scranton, 8 miles, in which are located the towns of Lackawanna county herein discussed.

The entire Wyoming Valley for a distance of 27 miles is supplied with water by a large number of water companies which have been brought under the control of one big holding and operating Company—the Spring Brook Water Supply Co.—chartered on March 2nd, 1896, for the purpose of the supply of water to the public, or the supply, storage and transportation of water or water power for commercial and manufacturing purposes in the district composed of the counties of Lackawanna and Luzerne. These subsidiary companies have not been merged or consolidated, but they are combined under one system through stock ownership and lease.

The system operated by the Spring Brook Water Supply Co., comprises a total of 44 water companies existing under their own charter, 35 in Luzerne county, and 8 in Lackawanna county, and one, the Spring Brook Water Supply Co., for both counties. All of these companies are active.

In addition, the Spring Brook Water Supply Co., acquired by purchase or otherwise, three other water companies in Luzerne county, whose charter rights were allowed to lapse. In the table appears the name of the town and its classification and population in order down the valley from Scranton, the water company chartered to supply the territory, the date of incorporation and class of company, whether active or inactive.

The total population in the valley excluding Scranton, is 284,563 and with it 414,430.

These several water work systems are so connected that the source of supply to one may be the source of supply to many others. For instance, the great storage reservoir on Spring Brook, in Lackawanna County, supplies water to most of the towns and cities in the valley. Infection of this supply would therefore be liable to cause an outbreak of disease throughout a vast population. Similarly the infection of any one of the other sources might cause a general epidemic in the valley or in the districts furnished with the water. Before taking up the typhoid outbreak of the current season, the several sources and the districts they supply, will be described.

In the following table are given the principal sources of supply of water to the public in the Wyoming valley:

1 Spring Brook Supply.
2 Covey Reservoir supply.
3 Fallings Springs supply.
4 Wilkes-Barre Mountain supply.
5 Crystal Lake and Pine Run supply.
6 Toby Creek supply.
7 Coal Creek supply.
8 Harveys Creek supply.
9 Little Wilkes-Barre Mountain supply.

1. Spring Brook Supply.

Spring Brook has its source in Clifton Township in Lackawanna county at the divide between the Lehigh River basin and the Lackawanna River basin and thence it flows in a generally northwesterly direction a distance of 12 miles to the Lackawanna River in Moosic borough. Three miles up the brook at a place called Glen Tannery, the Spring Brock Water Company built a storage and intake dam in the year 1893. It is a 25 foot masonry structure impounds 50,000,000 gallons, and tributary to it are 53 square miles of sparsely populated territory. From this reservoir 24 inch and 30 inch pipe lines are laid down the valley to Moosic borough and thence branch out over the territory to be supplied. This source furnishes more water than any other one source of the entire system under discussion, the maximum quantity being 11.5 million gallons daily.

Round Hole Reservoir.

Two miles above the intake is Round Hole reservoir built in 1902 for storage purposes. It is formed by a masonry dam 303 feet in length including a spillway of 140 feet, and 246 feet of earth embankment with core wall, making a total length of 549 feet. The top of the spillway is 87 feet above the creek bed and the water so impounded covers an area of 116 acres and comprises 1,279,000,000 gallons. The watershed is 36 square miles in extent and on it are located 123 occupied estates. These properties were inspected for stream pollution by the Department during the year 1908.

On the brook, 3 miles above Round Hole, is the site of the Nesbit reservoir, where a crib dam impounding 75,000,000 gallons was until recently intact. The watershed here is 15.74 square miles.

Maple Lake is a natural body of water at the head of Rattle Snake Creek, a tributary entering Round Hole reservoir. The outlet of this lake has been dammed up to form a reservoir of 300,000,000 gallons capacity. It has a small inlet, the watershed being 1.07 square miles only. The lake is fed mostly by springs. The elevation of high water is 1650 feet above sea level, that of Nesbit Lake was 1295 and that of Round Hole reservoir is 1155.13 and the intake reservoir is 910.26. The water from each one of the three storage basins, Maple Lake, Nesbit reservoir and Round Hole reservoir must flow down the natural bed of the creek into Spring Brook intake reservoir. The water company has purchased and owns and controls 10,312 acres in Spring Brook Valley equal to 30 per cent. of the entire watershed. A watchman lives near the intake and he devotes his entire time to the care of the company's property. A forester is also engaged in reforesting the land by the corporation. About 80 per cent. of the entire watershed of 53 square miles is wooded.

The Spring Brook Water Supply Company maintains a laboratory and has the services of a chemist and bacteriologist who also devotes part of his time to academy work during school terms.

Quality of Spring Brook Water.

In the following table are data for twelve years relative to the number of samples of Spring Brook Water collected and the number of times sewage organisms were found in the sample reported by this expert. It appears that out of 115 collections B. Coli were not found in a single instance:

Year.	No. of analyses.	B. coli found.
1899,	13	0
1900,	6	0
1901,	6	0
1902,	13	0
1903,	4	0
1904,	8	0
1905,	4	0
1906,	5	0
1907,	10	0
1908,	8	0
1909,	26	0
1910,	12	0
	115	0

The Department's inspection in 1908 showed that there were on the watershed above Round Hole 614 persons, 212 horses, 382 sheep, 191 swine, and 616 cattle. Orders of abatement were issued for 122 stream pollutions and all were abated with the exception of a pig-pen on the property of Ira Turner. This case was litigated before the nuisance was removed. The watershed between

Round Hole and the intake dame is unoccupied. It is very wild, hilly and wooded territory entirely owned by the water company and under patrol. The company has built a well graded highway and maintains it up the valley and it follows around the southern edge of Round Hole reservoir. There is a farmstead at the upper end of this body of water which is a mile and a half long owned by Richard Thomas. The Spring Brook Water Supply Company purchased the property during September of the current season and will tear down the buildings. There are on the watershed within 200 feet of streams eleven estates only. Once every month the watchman visits every dwelling and notes the sanitary conditions thereon. Any case of sickness is at once reported to him. His residence is connected by telephone with the company's office in Wilkes-Barre.

Trout and Monument Brooks.

Immediately south of the Spring Brook watershed is an area of 7.52 square miles drained by Trout and Monument Brooks on which there are three occupied estates. The brooks merge into one stream which flows into Spring Brook a short distance below Spring Brook intake dam. On this stream is a crib dam intake which, owing to its dilapidated condition, does not impound any water. It serves, however, to divert the flow into a 20 inch pipe which delivers the water by gravity into the 24 inch supply main leading down from the Spring Brook intake. Extending across this watershed and across the central portion of the Spring Brook watersed is the Wilkes-Barre and Eastern Railroad which has its terminus in Plains Township near Wilkes-Barre. One train daily each way is run with a combination baggage and passenger coach.

Distribution Spring Brook Water.

The Spring Brook 30 inch supply main reduces to 24 inch in Moosic borough and thence it extends through Duryea, crossing the Lackawanna River and the Susquehanna into West Pittston where it reduces to 20 inches and extends through Exeter and Wyoming into the upper part of Forty Fort borough where it branches into a 10 inch and 12 inch, the 10 inch extending through Forty Fort, Dorranceton, and Kingston to Edwardsville, and the 12 inch through Forty Fort, Dorranceton, Kingston, there reducing to 10 inch and extending through Larksville to Plymouth. There is a cross-over connecting the 10 inch and 12 inch pipe in Kingston so one may feed into the other. The distance from Moosic to Plymouth is 14 miles.

The Spring Brook 24 inch supply main reduces to 20 inch in Moosic borough and thence it extends through Duryea and Hughesville to Pittston City. The territory normally furnished is shown in the following table:

Place.	Population (Estimated.)
Moosic borough,	1,600
Taylor borough (low lands),	6,561
Old Forge borough (south of back road),	10,026
Duryea borough,	7,484
Avoca borough,	4,634
Pittston township (part only),	1,900
Jenkins township (Port Griffith),	1,500
West Pittston borough,	6,848
Pittston city,	16,262
Exeter borough,	3,537
Wyoming borough,	3,010
West Wyoming borough,	1,621
Forty Fort borough,	2,353
Wilkes-Barre city (west of railroad, city, 67,105),	33,000
Parsons borough (low land),	2,000
Miners Mills borough (low land),	1,659
	103,995

Auxiliary to the Spring Brook supply is that of Little Mill Creek, otherwise known as McAlpine Creek, and the West Pittston pumping station on the banks of the Susquehanna River.

Little Mill Creek Auxiliary Supply.

Little Mill Creek rises in Pittston Township near Mt. Pisgah and pursues a winding but generally northerly course, passing through the village of Dupont and the borough of Avoca and empties into the Lackawanna River at the edge of Moosic borough. The watershed is 14 square miles, is rugged and precipitous but some of it under cultivation. On the stream half a mile above Dupont village there is an intake dam impounding 100,000 gallons which serves merely to divert the flow of the creek into a 12 inch main leading to Dupont where it branches into two 10 inch mains, one extending to Pittston City and connecting with the 20 inch main from Spring Brook, and the other reducing to a 6 inch and 8 inch line extending through Avoca and connecting in Moosic borough to the 24 inch main from Spring Brook.

A one million gallon storage and distributing reservoir is connected at Avoca. It is formed of excavation and embankments riprapped and has been out of commission for five years. The elevation is such that owing to the small diameter of pipe and the large consumption of water, the pressure has not been sufficient to deliver water into the reservoir. It might be filled during the night and the storage held for emergency, but vandals pulled down the fence enclosure and otherwise menanced the purity of the reservoir water, so its use has been abandoned. However, there is a 1,250,000 gallon reservoir on the system at Pittston city which is kept full of water held in reserve.

The drainage area above the intake comprises 3.1 square miles, across which the tracks of the Wilkes-Barre and Eastern Railroad extend, and on which there are 18 occupied estates, the combined population being 62 persons, 49 cattle, 15 horses and 18 swine. There is one school house on the area.

On September 24th, there was no water in the creek or the reservoir. The pipes were being fed from the Spring Brook source.

West Pittston Pumping Station.

In the year 1896, the Spring Brook Water Supply Company erected a pumping station at the end of Susquehanna Avenue on the banks of the Susquehanna River in West Pittston borough and water was pumped from a temporary intake directly from the river in December of that year. The following season an intake filter crib, shaped like a cross was sunk in the bed of the river and covered by four feet of broken stone and gravel. It was completed in 1908 and has since been used to supplement the supply from Spring Brook by direct pumpage into a 30 inch main which parallels the 20 inch main from Spring Brook through West Pittston, Exeter, Wyoming and Forty Fort to the edge of Dorranceton where it reduces to 24 inch and is laid under the river to the city of Wilkes-Barre. The 30 inch line has a 12 inch branch to West Pittston.

The crib is in the east channel of the river a few hundred feet above the mouth of the Lackawanna River opposite Scovell Island. It is located where the currents are quite rapid. This tends to wash off the gravel covering over the crib. When the river is turbid a slight turbidity is observed at the tap in the pump house. The water is drawn through the crib and 1,860 feet of 36 inch cast iron section pipe. The machinery installed at the station comprises a Jeansville compound condensing pumping engine of 7,000,000 gallons rated capacity for 24 hours and a Holly double acting condensing pumping engine of 5,000,000 gallons capacity. On day when the station is in operation between four and six million gallons of water are pumped into the system on the average. The plant is held in reserve for emergencies and can be put in operation in 3 hours.

The manager of the water company states that it is customary by means of crossover to mix the River and Spring Brook water in the mains near the pumping station, so that the consumers in West Pittston, Exeter, Wyoming, West Wyoming and Forty Fort are furnished with the mixed water. In any event, these two supplies become mixed when they pass through the 24 inch pipe because there is no other avenue for the water to reach Wilkes-Barre.

This mingling of the two supplies in West Pittston is stated to have been accomplished throughout the current season. In the following table appears the number of days the pumps were in operation at the West Pittston station from January 1st, 1899, to December 31st, 1909.

	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	Totals.
January,	......	......	23	......	......	3	......	......	......	......	5	31
February,	15	......	28	......	......	12	9	13	......	15	......	107
March,	......	......	11	......	......	5	11	......	......	......	......	27
April,	......	......	......	......	......	......	......	......	......	......	......	......
May,	22	......	......	......	......	......	......	......	......	......	......	22
June,	30	......	......	......	8	......	11	......	......	8	......	57
July,	8	13	7	......	......	27	31	10	......	31	......	127
August,	11	22	19	......	......	6	31	31	27	31	2	180
September,	30	30	......	......	......	15	10	30	9	30	30	184
October,	31	31	......	......	19	......	13	31	......	31	31	187
November,	20	27	......	......	......	......	16	1	......	30	30	124
December,	......	......	......	......	......	......	......	......	......	31	31	62
Totals,	167	123	88	......	27	68	142	121	36	207	129	......

The pumps were started on the morning of July 13th of the current year and they have been operated continuously seven days in the week ever since. On an average five million gallons for 24 hours have been pumped.

Thus it appears that April is the only month in the year during which water has not been pumped from the river.

Quality of Susquehanna River Water.

The watershed of the Susquehanna above the intake at the pump house comprises 9,575 square miles on which there is a population of 500.844 persons. The greater percentage of both area and population is in New York State as follows: 6,267 square miles and 345.850 persons. The largest towns in that state on the watershed are Elmira, 35,754 population: Corning 14.863 population and Binghamton, population, 45,165 (census of 1900). In Pennsylvania all of Wyoming county, and parts of Bradford, Susquehanna, Luzerne, Lackawanna. Tioga, Wayne, Lycoming, Sullivan and Potter counties are within the basin, totaling 3,308 square miles with a population of 154,994 persons. The largest towns are Sayre, Bradford county, population, 5,243; Towanda, Bradford county, population, 4,663; Susquehanna, Susquehanna county, population, 3,813; Athens, Bradford county; population, 3,749; and Tunkhannock, Wyoming county, population, 1,305. (Census of 1900).

Sewage from all thess places is discharged into the river and but a few hours need lapse during average stages of the river between the time floating material is deposited in the river and the arrival of that material opposite the West Pittston intake. A sample of water collected by the Department from the top in the pumping station August 25th, 1910, showed the presence of 4 B. Coli and 40 water bacteria per c. c.. while a sample collected from the river at the same time did not reveal the presence of B. Coli and contained but 50 water bacteria. Probably at no time is the river water free from sewage organisms. After heavy precipitations, pollution is evident to a marked degree.

In the following table are data for eight years relative to the number of samples of Susquehanna River water collected at the West Pittston pumping station and the number of times sewage organisms were found in the samples as reported by the water company's expert.

Year.	No. of analyses.	No. times B. coli found.
1899,	9	0
1900,	2	0
1905,	4	0
1906,	5	0
1907,	6	0
1908,	32	1
1909,	21	0
1910,	7	0
	86	1

Thus it appears that out of 86 collections B. coli were found in one instance only in the tap water drawn from the pump house.

2. Covey Reservoir Supply.

The Convey reservoir supply comprises a drilled well, a reserve supply from Spring Brook, a pumping station, two storage reservoirs and a gravity system of distribution.

Covey Creek is a small mountain stream rising in Moosic Mountain in Lackawanna Township and flowing down through Moosic borough in a generally westerly direction for over two miles to Spring Brook, falling in this distance approximately 700 vertical feet. Across this stream at a point above which the watershed is uninhabited and the area is 1.5 square miles, is a reservoir of 14 acres in extent impounding 14,000,000 gallons, known by the name of Covey reservoir. It was formerly a natural pond. The dam is an earthen structure and the flowage is shallow, approximately 12 feet maximum depth. The elevation of the water level is 1068.25. Immediately above this body of water is a 20 foot dam impounding 10,000,000 gallons whose water level is 11.43 and whose watershed is 0.47 square miles. This is known as Stark Reservoir and it was built to increase the storage of the system.

The pumping station is in the adjacent valley of Spring Brook about a mile and a half below the Spring Brook water company's intake at a place known as Stalberts Crossing. Water is taken from the 24 inch Spring Brook supply main and it also can be drawn directly from the creek at the station. There is also an 8 inch well, drilled several hundred feet deep, at pump house. The experiment was a failure, the supply being limited. Water is raised by a million gallon Worthington pumping engine through 6000 feet of 10 inch pipe line against a head of 362 feet into the 10 inch gravity main which leads from Covey reservoir to the water district comprising Minooka, South Scranton, Taylor and Greenwood village near Moosic borough. The system was originally built by the Taylorville Water Company. Because of shortage of water, it ultimately came under the control of the Spring Brook Water Supply Company.

During the summer months and dry periods the water for the system comes exclusively from Spring Brook. The consumption district is elevated above the level of the Spring Brook intake and hence unless there be water enough flowing in Covey Creek to supply the demand, Spring Brook water must be raised by pumpage. The lowlands in Taylor borough get Spring Brook water by gravity. The highlands are furnished from Falling Springs. Prior to 1908 these highlands and at times the lowlands were supplied from the Covey system and a shortage of water resulted owing to limited capacity of the pump. The connections have not been severed. They are closed by gate valves.

In the following table is given the number of days Spring Brook Water was pumped into the Covey reservoir supply. The district consumes about 800,000 gallons on an average daily. The pump is operated continuously.

Month.	1907.	1908.	1909.	1910.	Remarks.
	Days.	Days.	Days.	Days.	
July,	--------	--------	7	2	Beginning July 29.
August,	--------	--------	23	31	
September,	--------	--------	30	30	
October,	--------	--------	15	--------	Operating at present.
November,	--------	--------	--------	--------	
Total,	105	95	75	--------	

The population in the water district of the Covey Reservoir Supply is given in the folowing table:

Place.	Population	Remarks.
Greenwood village,	A few consumers,	One colliery.
Minooka,	Many consumers,	
South Scranton (city),	Moderate population,	One large industry.
Bellevue (city),	Moderate population,	Several industries.
Total,	5,000	

3. Falling Springs Supply.

The Falling Springs supply was built by the North Mountain Water Supply Company to furnish water to the high districts in the Upper Wyoming valley. The work was begun in 1905 and completed in 1907.

Falling Springs Creek rises in Ransom Township, Lackawanna County, on the northwestern slope of the west mountain and pursues a southwesterly course for three miles to the Susquehanna River, entering the same just above the gap through which the river passes into the Wyoming Valley. In this distance the creek falls 840 vertical feet. Its greatest descent is in the last half mile.

About two miles below the source of the stream is located the Falling Springs reservoir at an elevation of 1350.74 feet above sea level. It drains an agricultural area of 0.79 square miles on which there are four occupied estates containing 22 persons, 12 horses, 33 cows and 8 swine. There is an inspection made of these farms every month by the company's watchman. Officers of the State Department of Health made a sanitary survey of the watershed during the year 1908 and served four notices for abatement of stream pollutions. The nuisances were removed.

This upper storage reservoir has a capacity of 229,410,000 gallons and the water from it flows along the bed of the creek to a second storage reservoir one-half mile down stream known as Campbells Ledge reservoir. It is at an elevation of 1,061.18 feet, stores 69,665,000 gallons and has a total drainage area of 1.65 square miles, unoccupied save for the four dwellings mentioned. The water from the creek is diverted into this basin which is located on the very top of the saddle of Campbells Ledge by an artificial canal 1400 feet long.

From this lower reservoir the water flows in the bed of a natural water course into Campbell's Ledge intake dam, elevation 972, located a few hundred feet down stream on the mountain side sloping towards the Lackawanna River. The tributary drainage area is 1.75 square miles. The dam stores 900,000 gallons only, hence it serves simply to divert the water into a 20 inch main leading to the water district.

The caretaker lives in a dwelling located near Campbell's Ledge reservoir but off the watershed. He devotes his entire time to the service of the company. There is no telephone communication.

The 20 inch pipe leads from the intake for a quarter of a mile to two branches: one a 16 inch main extending up the valley along the back road through the villages of Austin Heights and Sibley in Old Forge borough and Pyne village and the high ground in Taylor borough; and the other branch line, a 12 inch pipe, extending southerly for ¾ of a mile through Duryea borough, under the Lackawanna River to a valved connection with the 24 inch main from Spring Brook and thence it continues at a reduced size to Hughestown borough and to the villages of Cork Lane and Browntown in Pittstown Township. In the following table appears the estimated population in the district supplied by Falling Springs water:

Place.	Estimated Population.
Austin Heights village, Old Forge borough,	1,000
Sibley village,	300
Pyne village, Taylor borough,	500
Taylor borough, high ground,	2,000
Hughestown borough,	1,700
Cork Lane village and vicinity, Pittstown township,	22,000
Browntown village and vicinity,	1,500
	29,000

4. Wilkes-Barre Mountain Supply.

The Wilkes-Barre Mountain supply lies within Mill Creek basin.

Mill Creek rises at Mt. Pisgah in Pittston Township and pursues a westerly course through Jenkins and Plains townships, by Miners Mills borough, and the northerly line of Wilkes-Barre city, to the Susquehanna River, traversing in this distance 17 miles and draining a wild rugged area, and in the lower basin, a thickly populated one whose inhabitants are chiefly engaged in mining coal. The principal tributaries are Gardners Creek and Laurel Run.

Gardners Creek lies adjacent to and north of Mill Creek. It adjoins the latter near Hudson village in Plains Township, after flowing through Jenkins Township and Laflin borough.

Laurel Run lies adjacent to and south of Mill Creek and joins the latter at the City line after flowing through Laurel Run borough, Plains township and Parsons borough.

High up on these mountain streams above the coal measures are the storage reservoirs and intakes of the supply.

Laurel Run Reservoirs.

Laurel Run borough is a mountain town of about 800 inhabitants, the greater per centage residing in two villages, Olivers Mills and Georgetown. The Wilkes-Barre Mountains divide the borough into two districts, the northern district of George being on the steep mountain side sloping towards the city of Wilkes-Barre a mile distant, and the southern district, Olivers Mills, being located in a steep valley between Wilkes-Barre Mountain and Wyoming Mountain. Laurel Run rises in Wyoming Mountain in Bear Creek township at an elevation of about 1500 feet above Wilkes-Barre city. It flows down close by the Wilkes-Barre and Easton turnpike to the village of Olivers Mills and thence it turns and flows northerly down the valley between the tracks of the Central Railroad of New Jersey and the mountain cut off of the Lehigh Valley Railroad, a distance of two miles, to a gap in the Wilkes-Barre mountains in Plains Township through which it emerges into the Wyoming valley. At the lower end of this gap there are two storage reservoirs, one immediately above the other.

The upper reservoir is formed by a masonry dam about 230 feet long, its crest at the spillway being 24 feet above the bed of the stream and at an elevation of 857.82 feet above sea level. The flooded area comprises 8 acres and 35,000,000 gallons of water are impounded. This reesrvoir is used as an intake for the intermediate district in Wilkes-Barre Township and vicinity, including the heights in the city. The watershed is 8.95 square miles in extent and it is wholly mountainous and quick spilling. Cloudbursts have occurred of such volume as to submerge the entire dam. In the summer season the yield in inconsiderable and the supply has to be supplemented from Mill Creek, hereinafter described.

On the watershed there is a resident population of 289 persons, 29 horses, 9 cattle and 22 swine. There are 48 dwellings, a club house, one farm, a church, a school house, a railroad station and a powder mill on the area. Two years ago the State Department of Health made a sanitary inspection of the watershed and found 47 properties in an unsatisfactory condition. Abatement notices were served and the nuisances were removed.

Because of the precipitous slopes there are no tributaries from Wilkes-Barre Mountain; but on the northern slope of Wyoming Mountain there are important tributaries (draining wooded areas intersected by township road and extensive private boulevards), named Deep Hollow Run, Wheelbarrow Run or Gin Creek, Sand Run and Kelly Creek.

On these mountain uplands berries grow in profusion and the fruit is gathered by the public at random.

The Central Railroad of New Jersey and the Lehigh Valley Railroad pass into the Wyoming Valley through Laurel Run Gap almost directly over head of the run in the narrow gorge far below. The latter railroad is used exclusively for freight, theer being one train only each way daily drawing a combination passenger coach with toilet; but the former is an important passenger traffic line.

High up on Gin Creek is an intake dam from which a 3 inch pipe line extends under Laurel Run and up through the Gap to Mountain Park on the north slope of Wilkes-Barre Mountain just off the water shed. This resort is maintained for excursion parties by the Central Railroad of New Jersey.

On Deep Hollow there is a small intake and water pipe supplying water to the Lehigh Valley Railroad tank.

On Wilkes-Barre Mountain, there are ten summer cottages owned by city people. These buildings are quite expensive and are equipped with modern sanitary facilities. The water works system is of private ownership and the supply is taken from a small intake dam near the head of Laurel Run on Wyoming Mountain and is piped over to the top of Wilkes-Barre Mountain. Lower down there is a small reservoir on the run from which water is piped to the powder works and possibly several dwellings in Oliver Mills village. Waste water is disposed of in cess-pools, excrement is collected in vaults and the city scavenger removes it periodically.

The lower reservoid is also a masonry dam about 200 feet long and its crest at the spillway is 20 feet high and at an elevation of 709.1 feet above sea level which is 148.72 feet lower than the upper reservoir. The flooded area comprises 3.5 acres and 5,000,000 gallons only are impounded.

During the summer and fall months it operates as an equalizing reservoir for the low service system; but when there is a surplus of water from the upper reservoir it overflows to the lower one and is then fed directly into the distributing system which receives Spring Brook water. The company owns 150 acres on the watershed, over 100 acres being along Kelly's Run.

From the intermediate service a 24 inch pipe extends down into Parsons borough where it branches into three lines, 20 inches, 14 inches and 16 inches in diameter respectively. The 16 inch main is laid northerly to Miners Mills where it connects to the Mill Creek main. The 20 inch extends southerly in Scott Street in the city to Pennsylvania Avenue to Northampton, to Hancock and then 14 inches to Lehigh where it connects with the mains from Crystal Lake. There is no gate at this point nor at the connection at the other end with Mill Creek main, the two waters mingling here at the point of probable balance of the pressure, depending somewhat, of course, on the consumption in the various districts.

The 14 inch intermediate service main also extends in Scott street, reducing to 10 inches and terminating at the yards of the Central Railroad of New Jersey where the intermediate service ends. There is a gate here kept closed on a connection to a 12 inch main extending to Pennsylvania avenue. This is in the low service district.

From the low service reservoir a 16 inch main extends down through Parsons borough with a branch line laid to Miners Mills, the 16 inch continuing through Plains Township to the city at Pennsylvania avenue, where it joins 10 inch and 12 inch pipe connections to the 24 inch mains under the Susquehanna River from West Pittston and Spring Brook supply. The 14 inch intermediate service main extends to the low service dam also but the gate is kept closed.

All the land west of Scott street, Pennsylvania avenue and the Pennsylvania Railroad in the city is located within the low service district supplied by Spring Brook and West Pittston pumps, or by surplus Laurel Run water, when there is any such overflow from the upper reservoir. On July 2nd, 1910, was the last time that water was furnished from Laurel Run to the low service during the current year.

In the following table is given the estimated population in the intermediate service district receiving Laurel Run water:

Place.	Estimated Population.		
	Total.	On intermediate.	in low.
Parsons borough,	2,587	587	2,000
Wilkes-Barre (Heights) and most of all ward 9,		11,400	
Wilkes-Barre (East End), ward 2,		2,600	2,600
	2,587	14,587	4,600

From the very nature of the watershed and its occupation, Laurel Run is an unsafe source for a domestic supply if the water be furnished in its raw condition During the summer of 1889, between June 20th and August 1st, there were 229 cases of typhoid fever in Wilkes-Barre, for the month of August 197 additional cases for September 92, and for October 40 additional cases, making 558 cases in the city to which should be added 42 cases in the hospital and 50 cases in Parsons and Miners Mills, making a total of 650 typhoid cases occurring almost exclusively among persons living in the territory supplied by the Laurel Run water at that time. The conclusions of the investigation by competent medical men were that the evidence pointed strikingly to Laurel Run water as the cause of the outbreak, based simply upon the fact that in the city and outlying suburbs supplied by two water companies, in the territory of the one (Wilkes-Barre Water Company) supplying Laurel Run water, there were found 650 cases of typhoid fever, while in the territory of the other (Crystal Spring Water Company) which supplies nearly as large a number of people there were practically no cases of the disease.

In the following table are data for 12 years relative to the number of samples of Laurel Run water collected at the upper reservoir and in the city from taps on the high ground as reported by the water company's expert.

Analyses of Laurel Run Water.

Year.	Samples at Reservoir.		Samples in City.	
	No. of analyses.	No. of times B. Coli found.	No. of analyses.	No. of times B. Coli found.
1899,	5	0	9	0
1900,	10	1	13	0
1901,	3	0	15	0
1902,	10	0	13	1
1903,	11	1	14	0
1904,	5	0	15	2
1905,	3	0	15	0
1906,	4	0	6	0
1907,	--------	--------	42	2
1908,	3	0	138	3
1909,	2	0	183	3
1910,	14	2	131	3
	70	4	582	14

The Department is not informed of the dates on which the collections were made.

This sampling may have been done at the optimum period. Samples collected by the State Department of Health during the drought of the year 1909 were analyzed with the results given in the following table.

	Bacteria Per C. C.	
	Total.	B. Coli.
Laurel Run, lower reservoir,	32	0
Laurel Run, upper reservoir,	80	0

Mill Creek Reservoirs.

The Laurel Run system was the first one built in the Wyoming valley. The date of construction was about 1858. The source is now supplemented by two storage reservoirs on Mill Creek watershed and an intake dam which furnishes water directly to Miners Mills and Hudson besides feeding it into the Laurel Run intermediate service mains. On Mill Creek, two miles below its source is a reservoir impounding 616,700,000 gallons of water. It floods an area of 100 acres and is formed by a masonry dam 285 feet long, 63 feet high above the stream bed, the crest being 1,432.89 feet above mean sea level. The dam is flanked by earth embankment with core wall, interior slopes being riprapped. The tributary drainage area comprises 5.07 square miles mountainous, well wooded territory on which are located five occupied estates which were inspected by the Department in 1908. The water is drawn off through two 20 inch pipes near the bottom of the dam, whence it flows along the bed of the stream through a part of Jenkins Township and Plains township to the intake dam on Mill Creek nearly three miles distant from the reservoir. In the last mile the stream and its tributaries course along and under public highways, at a number of points in close proximity to dwellings and the large quarrying operations of Mendlers near the mountain cut-off of the Lehigh Valley Railroad where between 25 and 45 men are employed. The stream also passes under the railroad before reaching the intake dam. This intake was built in 1897 and it consists of a masonry structure 112 feet long and 31 feet above the creek bed. It is located in a gorge, floods above 2.5 acres and ponds up 4,000,000 gallons only; hence it serves simply to divert water into the 20 inch supply main which immediately reduces to 16 inches and leads to the town. The elevation of the dam is 906 feet above mean sea level. Its tributary area is 10 square miles. The population is located above the railroad and principally along the highway near the quarry. Including the houses on the reservoir watershed, there are eleven farms, nine other dwellings, boarding houses or shacks, two school houses, and one hotel on the drainage area and a present population of 115 persons, 30 horses, 118 cattle and 30 swine. The Department in 1908 issued 17 orders of abatement for stream pollution. Improvements have been made. Ten new vaults were constructed, 4 new cesspools and 7 tight boxes. Two manure pits were built and piles of rubbish were removed. The foreigners are not over particular and the risk in relying upon their observation of hygienic and sanitary precautions to prevent contamination of the nearby flowing waters is extremely hazardous.

The water compay's watchman resides at the intake dam He devotes his entire time to inspections and care of the company's property. There is no telephone communication. About 10 acres at the intake and 600 acres of the reservoir watershed are owned by the company.

Immediately below the railroad, where the highway and stream pass under, through a stone arched bridge, there is a low dam in the creek about 100 feet higher than the intake dam comprising the head works to a canal built by the water company in 1906 to divert as much of the flow of Mill Creek as may be desired into the upper reservoir on Laurel Run. This is 11,800 feet long 7,000 feet being in rock excavation and the remainder in earth excavation. The bottom is three feet wide, the sides which are riprapped, slope 1.5 to 1 and the top of the side embankments are 6 feet above the bottom of the canal. The grade of the canal is one feet in 1,000 and its discharging capacity per 24 hours is figured at 57,000,000 gallons. Care has been taken where the line passes under the highway known as the boulevard, to build well designed concrete bridges excluding road drainage. At the railroad bridge, however, there is opportunity for this kind of pollution. There are three such concrete bridges. The water company owns a 60 foot right of way along the canal. The land is unoccupied mountain slope. The line has not been fenced. It terminates in a brooklet tributary to the upper Laurel Run reservoir whence the water tumbles down over a rocky bed for a few hundred feet, into the said intermediate service reservoir.

Just below Mill Creek intake dam there is a tributary called Deep Creek flowing down from the south. It is a small stream not over a mile long following for half its length the Lehigh Valley Railroad cut-off. On this creek near the source where the watershed is 0.87 square miles only, the water company built a storage reservoir in 1908, called Deep Hollow Reservoir, by the erection of a concrete dam 790 feet long and 37 feet above the bed of the creek. The crest is 1121.65 feet above sea level, at which elevation 229,661,500 gallons are impounded. By the use of flash boards 19 inches in height nearly 12,000,000 additional gallons storage can be secured. The dam floods an area of 41.54 acres and for the greater part of its length the reservoir is contiguous to the railroad.

The water company owns or controls all of the watershed. The area of itself is insufficient to fill the basin. The company also owns and to the south in Bear Creek and Plains Township through which the Pittston and Bear Creek Boulevard extends, and on Kelly Creek, draining that area at a sufficiently high elevation. A low diverting dam has been built and a ditch has been excavated which conducts the rainfall from about one half square mile into the Deep Hollow reservoir, making the total watershed of the latter 1.37 square miles. It is wholly wild and unoccupied.

Water is drawn off from the reservoir by means of two 16 inch discharge pipes and it flows down the creek bed, falling 75 vertical feet in about 2,000 feet to the canal into which the water flows and is ultimately delivered to Laurel Run reservoir. Any surplus or overflow from Deep Hollow passes by means of a weir in the lower side of the canal into the creek bed beyond and is wasted. In the following table are given the analyses of Mill Creek and Deep Creek waters:

Analyses of Mill and Deep Creek Waters.

Year.	Mill Creek.		Deep Hollow.	
	Number of analyses.	Number of times B. Coli found.	Number of analyses.	Number of times B. Coli found.
1899,	12	0	--------	--------
1900,	1	0	--------	--------
1901,	6	0	--------	--------
1902,	2	0	--------	--------
1903,	--------	--------	--------	--------
1904,	6	0	--------	--------
1905,	3	0	--------	--------
1906,	3	0	--------	--------
1907,	4	0	--------	--------
1908,	3	1	1	0
1909,	2	0	3	0
1910,	4	0	2	0
	53	1	6	0

These analyses were reported by the water company's expert. The State Department of Health collected samples during the summer of 1909 and analyzed them with the following results:

	Bacteria per c. c.	
	Total.	B. Coli.
Mill Creek reservoir,	150	0
Mill Creek intake	60	0
Deep Hollow reservoir,	30	0

The 16 inch main from the intake passes down Mill Creek Valley into Miners Mills, there connecting with the 16 inch main extending to Parsons borough and the intermediate service district. A 6 inch branch line is laid northerly to Hudson village in Plains township and it extends on into Plains village where it connects with an 8 inch main from the Gardner Creek supply but the gate is kept closed so that Plains is ordinarily supplied with Gardner Creek water.

Miners Mills has a population of 3,150. About 1,100 persons are supplied by the intermediate service and 1659 persons by the low service. Hudson village has an estimated population of 1500. It gets Mill Creek water. Hence in the Mill Creek district there are 3,000 persons on the intermediate service.

Gardners Creek Reservoir.

In the year 1898 the water company built a storage reservoir on Gardners Creek about three miles below the source of the stream at an elevation of 1075.42 feet above sea level. It is an earth embankment with masonry core walls 518 feet long and 34 feet high, impounding 73,975,000 gallons yielded from a watershed of 5.13 square miles of which the water company owns 742 acres. On this area there are two occupied estates only with 11 inhabitants. The flooded area comprises 15 acres and the storage is excellent. The water is drawn off into the stream below through two 20 inch pipes and it runs along the bed of the creek for three quarters of a mile to an intake dam at elevation 916 known as Laflin reservoir, which ponds up 10,000 gallons only. It serves merely to divert the water into the supply mains to the town. This intake has a drainage of 2.88 square miles to draw from between it and the storage reservoir above. There are a number of dwellings where drainage might flow to the stream or reservoir. The surface wash from the mountain cut-off partly drains into the stream. Ditches have been dug about the buildings in the village and the water is thus diverted to below the dam. Inspectors by officers of the Department did not reveal any sewage pollution of the waters feeding to the reservoir, but there is more or less danger here of accidental contamination.

Lamp Black Creek coming from the east joins Gardner's Creek immediately below Laflin reservoir and in the former creek there is a dam by means of which water may be diverted through a ditch into Gardner's creek above Laflin intake. This water, however, is not so diverted because there are a number of dwellings at the Crescent Coal Company's colliery now occupied by Italians which menace the purity of the water and render it unsuitable for drinking purposes.

The water from Gardner's Creek may be diverted into Mill Creek intake dam from a point a short distance below Gardner reservoir by means of a pipe line, an open ditch and a water course naturally tributary to Mill Creek. It is through this means that the water from the storage basin on Gardner's Creek may be fed into the intermediate service district beginning at Miners Mills.

There are two supply mains leading from the Laflin reservoir, one an 8 inch and the other a 12 inch line. The 8 inch line terminates in Laflin borough. The 12 inch line extends through the borough and branches into 6 inch line and a 10 inch line. The 6 inch pipe goes to Inkerman village, Jenkins township, and the 10 inch line goes to Plainsville village with an 8 inch branch to Plains village and a 6 inch line to Midvale village, all three in Plains Township. The estimated population served by the Laflin reservoir is given in the following table:

Town.	Estimated Population.
Laflin borough,	300
Inkerman village,	1,000
Plains village,	2,500
Plainsville village and vicinity,	1,500
Midvale village and vicinity,	1,500
	6,800

The daily consumption in this district is said to be about 1,000,000 gallons.

5. Crystal Lake and Pine Run Supply.

The Crystal Lake and Pine Run Supply comprises waters from Crystal Lake, Wapwallopen Creek, Stetlets Creek, Solomons Creek and Pine Run and Richards Island.

Solomons Creek rises in the village of Mountain Top in Fairview township at the foot of the southern slope of Penobscot Knob, the highest point of the Wyoming Mountain range, and thence it flows northerly through the most important opening in the Penobscot-Wyoming range called Solomon's Gap. It is through this gap that the Lehigh Valley Railroad and the Central Railroad and the Central Railroad of New Jersey pass into and out of the Wyoming Valley. The stream continues northerly down a steep narrow ravine through the Wilkes-Barre Mountain range and emerges into the plain of the valley at Ashley borough three miles from its source, having fallen in this distance 1100 vertical feet. Thence it continues northerly through Ashley borough and the southern part of Wilkes-Barre City where it turns and flows westerly in Hanover township to the Susquehanna river opposite the lower portion of Plymouth borough.

The entire length of the ravine to Ashley borough is occupied by a series of plains and inclines up which coal cars are drawn by cable. The layout is known as the Central Railroad of New Jersey Plains.

At Mountain Top is a settlement of some 1500 inhabitants mostly engaged in railroading. It is known as Fairview village. Most of the streets and dwellings are on land draining to Wapwallopen Creek.

Pine Run Reservoir and Intake No 6.

Pine Run rises in the borough of Laurel Run at Olivers Mills and flows southwesterly parallel and not far distant from the Mountain cut-off and Central Railroad of New Jersey, draining the steep slopes between the Wyoming and Wilkes-Barre range, and joining Solomons Creek at the gap in the Wilkes-Barre range, having traversed a distance of about three miles and falling 500 vertical feet. On this run near its mouth there is a masonry and concrete dam impounding 7,500,000 gallons at an elevation of 730 feet above mean sea level Its watershed is four square miles and on it are three habitations at Olivers Mills besides the railroads and Ashley boulevard. The Pine Run reservoir is the point of distribution for all of the supply of the Crystal Lake and Pine Run system used for drinking purposes, excepting the small amount collected at the Empire Reservoir. On a small tributary of Pine Run entering it from the south, just below the reservoir, is a concrete masonry intake 6 feet high known as No. 6 Plain intake or Crystal Spring No. 6. It is 15 feet higher than the main dam, drains an area of .44 square miles of uninhabited mountain slopes traversed by the boulevard, stores no water and serves principally to divert the flow into Pine Run reservoir. The brook is dry most of the year. An artesian well is located near the intake, the water from which is supposed to flow into it but the experiment is not successful.

Solomons Creek Intakes.

On Solomons Creek there are two intake dams known as Red Mill and No. 5. Red Mill dam is a small masonry structure located about half a mile below the mouth of Pine Run and elevated 748.1 feet. It ponds up about 20,000 gallons only and drains an area of 7.28 square miles. It was never intended to do more than divert as much of the flow of Solomons Creek as desired to Ashley borough and vicinity. For many years the water has not been supplied for drinking purposes because of the pollutions on the watershed. At present a 4 inch pipe furnishes water to No. 8 colliery and it is used for washing coal only, so it is reported.

Intake No. 5 also known as Crystal Springs No. 5, is a masonry dam 10 feet high and 30 feet long on Solomons Creek a short distance above the mouth of Pine Run. It has an elevation of 990 feet above sea-level, stores no water and was built to divert water from the creek through a 12 inch pipe line to Pine Run reservoir. Its tributary drainage area is 2.18 square miles on which there are a number of stream pollutions of a potential character. The menace is so great that the water company has abandoned the use of this intake as a source of public water supply, but the pipe connections have not been severed. There is a 6 inch pipe leading from the dam to the boiler plant at the power house of the Plains of the Central Railroad of New Jersey and water is supplied for steaming purposes. If not enough water can be had from the creek then the supply is augmented from the pipe line leading from Crystal Lake.

Crystal Lake and Filter.

Crystal Lake is located on Wyoming Mountain near the top partly in Bear township and partly in Fairview township about five miles south of Wilkes-Barre city. It has an elevation of 1937 feet above sea level, drains an area of 2.92 square miles of uninhabited watershed traversed by highways and private roads and contains when full 1,650,000,000 gallons. This was formerly an immense shallow depression of about 450 acres. In the centre of this area there was a stagnant pond, known to huntsmen and miners as "Stink Pond" on account of the odor arising from it caused by decaying vegetable matter. By damming up one end of this depression about 10 feet high the surrounding forest land was overflowed and the trees died. Advantage was taken of the winter season to cut the trees off on the level of the ice and remove them. The stumps were then left to decay with the result that the water was impregnated with decomposing vegetable matter. The pond was given the name of "Crystal Lake." During the year 1904 the surface was raised two additional feet. During the latter year improvements were made around the shores and several low dams were erected to cut out shallow flowage from the lake water.

Crystal Lake is at the head of Wapwallopen Creek. This stream flows in a generally southwesterly direction 16 miles to the Susquehanna River at Wapwallopen which is 12 miles below Nanticoke borough.

Lake water was first conveyed around the hill and over the divide into Solomons Creek by means of a small diverting dam on Wapwallopen Creek at a point about a quarter of a mile below the outlet of Crystal Lake and a 12 inch pipe line reducing to 10 inches about 2 miles long. The dam was known as Wapwallopen intake No. 4. It had no storage and served only to turn the water into the pipe which discharges into Solomons Creek whence the water flows by gravity down the latter to intake dam No. 5. In this course down the mountain brook the water was clarified and the odors removed, partly by aeration and partly by the removal of tannic acid through some chemical action possibly in connection with the mineral constituents of the acids which were deposited in the bed of the creek at the power plant and were washed along to pools where natural filters formed, so that prior to the time that Solomons Creek was condemned as a channel for the water, owing to the danger from sewage pollution, no complaint about Crystal Lake water was registered, so it is reported, relative to colors and odors. It became necessary, when this natural purification was abandoned, to adopt some artificial purification. This was mainfest when Crystal Lake water was piped to Pine Creek reservoir for distribution. The algae contamination of the lake waters was so considerable as to render them objectionable. Hence in 1895 the Crystal Spring Water Company erected a filter plant on the banks of Pine Run reservoir about 60 feet higher than the surface of the water Its object was simply to remove leaves and pieces of bark and other floating substances and to reduce any trouble from algae. There is now a 14 inch pipe line from Crystal Lake down the valley of Solomons Creek to Fairview and thence reducing to 12 inches and terminates in a receiving tank 17 feet in diameter and 16 feet high at the filter plant from which the water is fed to mechanical filters, 14 tubs in all, each capable of filtering 500,000 gallons in 24 hours. Coagulant solution tanks are provided but no chemicals are used. The plant is operated continuously for 9 months in the year. The remaining 3 months Crystal Lake water is by-passed around the filter into Pine Run reservoir. The filtrate is very highly colored. To help remove the odors the water is delivered into the said reservoir by means of several spraying nozzles. The head is sufficient in the pipes to throw the water in the air a number of feet, whence it falls like rain into the pond below. However, the water retains its dark brownish hue.

A caretaker lives at Crystal Lake and the filter operator is always on duty at Pine Run reservoir.

Stetler Creek is a small tributary of Wapwallopen lying immediately west of Crystal Lake and entering the creek one-half mile below the outlet of the lake. On it near the mouth is a low diverting dam without storage called Stetlers intake. It is of little use. Its elevation is 1,884.30 above sea level and its watershed is 0.17 square miles only. The water is piped over into Wapwallopen intake main and the supply is furnished to the railroads at Fairview where the pipe line terminates. There is a crossover here connecting with the supply main from Crystal Lake.

The distributing district is reached by two supply mains from Pine Run dam. One is 16 inches in diameter and is laid directly into Ashley and thence to Hanover and Wilkes-Barre township and the city. The other line is 14 inches in diameter reducing to 10 inches off of which there is an 8 inch pipe leading to the Empire reservoir in Wilkes-Barre township near Georgestown.

Empire Reservoir.

The Empire reservoir was formerly a swale. It is now as irregularly shaped basin excavated in the earth with rip-rap sides and surrounded by a high board fence. It is located in open field, has a very limited watershed and contains when full to an 8 foot depth, 3,000,000 gallons. At this level its elevation is 748 feet above sea level. It serves as an equalizing basin for the intermediate service of the Crystal Lake and Pine Run supply and the Wilkes-Barre Mountain supply, the service pipes in these two systems having open connections at several points. Much of the time there is little water in the Empire basin owing to the large draft in the water district. Not infrequently, the 8 inch supply main which feeds to the reservoir has to be throttled nearer the town, in order to fill the reservoir or supply enough water to the pump adjoining the reservoir.

Laurel Run Borough High Service System.

Auxiliary to the intermediate service of Crystal Lake and Pine Run Supply is that of the Laurel Run borough high service system. This comprises a pumping station, a distributing system in Georgetown within Wilkes-Barre township and also that part of Georgetown in Laurel Run borough and a storage tank on the mountain side. Two hundred and forty families are on this high service comprising about one thousand inhabitants. The water is drawn from the 8 inch supply main from Pine Run dam at a station located adjacent to the Empire reservoir. The attendant at the pump house is also watchman at the reesrvoir. There is one Otto gas engine of 30 H. P. direct connected to a triplex Dean pump, capacity 500 gallons a minute by means of which the water is raised through the distributing system into a storage tank on the hill. The pressure is about 250 pounds at the pump. The tank is kept nearly full. The pump is held in readiness for fires. This system was built during the latter part of the year 1907 and it was put in commission on the second day of January 1908. The territory south of Walnut Street in the township is on the high service and in the vicinity the people are supplied directly from a 4 inch pipe taken off of the 8 inch supply main from the reservoir.

Richards Island Pumping Service.

Richards Island contains 77 acres, is owned by the Spring Brook Water Supply Company, and is located in the Susquehanna River opposite the lower end of Wilkes-Barre City and the upper end of Plymouth borough. It is low lying and subject to inundation.

On the island near the lower end is a pumping station and intake well. The well is a large excavation made in the island and open. It is about 80 feet wide and 150 feet long and 29 feet deep from the surface. The side slopes to the top of the side retaining crib work, beginning 6 feet from the surface and extending down about 12 feet. In the centre and approaching the sides a hole has been excavated about 11 feet deeper and on the day of the Department's inspection this summer, there was 11 feet of water in this hole, the surface of which was reported to be 1.6 feet below the river level. The geological formation is sand and gravel and the water is supposed and in all probability does filter in from the river channels through at least 175 feet of natural filter. The installation at the station consists of a 5,000,000 triple expansion of Jeansville pump. The water is raised through a 20 inch suction terminating four feet from the bottom of the well into a 24 inch main which supplies a number of colleries in Hanover Township and extends to the Ashley shops in Ashley borough. A 12 inch main also leads into the mains at Plymouth and a 14 inch main connects with the Wilkes-Barre piping system. None of the water goes to the city or to Plymouth borough under ordinary conditions. The average pumpage is 1,750,000 gallons. The pump is run on the Holly system and its speed varies to maintain a pressure of 105 pounds. Water is furnished to Lee Park, Buttonwood, Breslau, Christopher, Llewelyn, Edge Hill, Ashley Shops, Colliery No. 21, Maxwell Colliery, all in the township comprising about 3500 population.

In the following table is shown the number of days the pump was in operation at Richards Island from July 1st, 1905, up to date.

Month.	1905.	1906.	1907.	1908.	1909.	1910.	Total.
January,					5	19	24
February,					0	17	17
March,					0	0	0
April,					0	8	8
May,					0	9	9
June,					0		0
July,	5	0	0	0	0		5
August,	28	13	0	27	0	31	99
September,	5	28	23	30	18	30	134
October,	0	23	0	25	26	3	77
November,	0	0	0	30	30		60
December,	0	0	0	25	27		52
	38	64	23	137	106	117	485

During the current year the pump was started on April 13th and stopped April 20th. It was then operated between May 18th and 26th inclusive. It was then started August 1st and run continuously to the end of October 3d.

In the following table are given the results of analyses of samples of Richards Island water collected from the tap at the pump house as reported by the water company's expert:

Richards Island Water.

Year.	Analyses.	B. Coli.
1902,	2	0
1905,	1	0
1906,	5	0
1907,	4	0
1908,	7	0
1909,	12	0
1910,	18	1
	49	1

The Department analyzed two station tap samples in 1909 and found them free from sewage organisms. Forty B. Coli per c. c. were found in the river water opposite the island. The sewage of Wilkes-Barre city and of the other towns in the Wyoming Valley is discharged into the river. When the island is flooded the pump well is filled with this foul water and suspended sewage matter may be lodged therein. This water has to be pumped out when the flood recedes and it is wasted. A solution of copper sulphate is used by the water company to disinfect the well. This solution is also used at times to kill the algae which grow abundantly. It is not re-assuring, however, to think that this basin is filled every year with sewage water. The flooding could be obviated by proper protective works.

When the pumps are not in operation the Hanover Township district is furnished with Crystal Lake and Pine Run water.

Distributing District and Quality of Water.

In the following table is given the estimated population in the districts supplied by the Crystal Lake and Pine Run system including both the intermediate service and the high service and the pumping district.

Place.	Estimated Population.
Intermediate Service.	
Wilkes-Barre city, parts of wards 3, 6, 9 and 15, and all of wards 13 and 14,	20,000
Wilkes-Barre township (greater part),	4,000
Hanover township (part),	2,500
Ashley borough,	5,600
	32,100
High Service.	
Laurel Run borough service,	1,000
Pumping Service District.	
Hanover township (part),	3,500
	35,600

In the following table appears the results of analyses of samples of water collected at Crystal Lake, Pine Run and from taps in Ashley borough.

Year.	Crystal Lake.		Pine Run.		Ashley Tap.	
	Samples.	B. Coli.	B. Coli.	Samples.	Samples.	B. Coli.
1899,	2	0	2	0		
1900,	2	0				
1901,	5	0	2	0		
1904,	4	0				
1905,	2	0	2	0		
1906,			3	0		
1907,					7	0
1908,					19	0
1909,					24	0
1910,	2	0			11	1
	17	0	9	0	61	1

The above analyses were reported by the Water Company's expert. During the drought of 1909, the State Department of Health collected and analyzed samples.

Place.	Samples.	B. Coli.
Empire reservoir,	1	0
Pine Run reservoir,	1	0
Crystal Lake filter,	3	0
Crystal Lake,	5	0
Tap in Ashley,	1	0
Tap in city,	5	1
	16	1

6. Toby Creek Supply.

In connection with the Toby Creek supply, there is a storage reservoir, intake dam, filter plant, filtered water basin and the distributing system including a high service pumping district.

Toby's creek rises in Dallas Township near Lehman Station on the Lehigh Valley Railroad, and thence it flows southeasterly through the township and Dallas borough and by the Shaverstown village and Trunksville village in Kingston township and by Courtdale borough and through Luzerne borough and Prindle township and along the boundry between Kingston borough and the boroughs of Edwardsville and Larksville to the Susquehanna River opposite the lower part of Wilkes-Barre, traversing in this distance about 10 miles and descending over 700 vertical feet. In Kingston township 12 miles below Trunksville at Hillside Station on the Wilkes-Barre, Dallas & Harveys Lake Trolley line is the west branch of Toby's Creek called Huntsville Brook and on this stream 2-21 miles from Hillside there is a masonry dam some 25 feet high, which impounds 1,750,000,000 gallons. The site was originally a natural lake. Four hundred acres are now flooded including much land from which the loam, shrubs and stumps were but partially removed. Hence the water at times contains the odors of decomposing vegetable matter and is correspondingly colored. Luxuriant algae growths occur especially in the filtered water basin.

The water company owns all the land around the shores of the lake comprising several hundred acres The tributary drainage area is 8.44 square miles of rolling farming country on which there are 110 occupied estates containing a population of 374 persons, 303 cattle, 150 horses, 103 swine.

The water is discharged from the reservoir by means of cast iron pipes, into the brook, whence it flows along the channel passing under and closely by a main highway and receiving the flow from the tributaries to the north to a mile above Hillside, where Browns Creek coming from the west and draining a watershed of about 2 square miles of its own of cultivated land well populated, enters, whence Huntsville Brook continues along the highway and under it passing through the highly cultivated farm known as the Hillside dairy to a filter plant near the mouth of the brook. Here there is a masonry intake dam, elevated 822.44 above sea level and having a total watershed of 14.84 square miles. The population between it and Huntsville reservoir is composed of 287 individuals residing on 94 occupied estates.

The Hillside dairy is extensive. While the owner has taken extreme precaution to retain all barnyard drainage in pits constructed for the purpose, yet the pollution of the water of the brook from fertilized fields and by cattle wading in the brook and by roadside drainage and from the other occupied estates, renders the raw waters of the flowing streams undesirable from a sanitary standpoint for drinking purposes.

A caretaker lives near the Huntsville dam and it is his duty to make sanitary inspection at the dwellings and farm buildings on the watershed and to keep informed of any sickness among the inhabitants The water company has refrained from laying a pipe line from the reservoir to the filter house for two principal reasons: first, because the lake waters are improved through aeration in flowing down the bed of the stream; and second, because the flow from Brown's Creek would necessarily be eliminated unless an intake dam were erected upon it.

The filter plant was erected in 1895 to obviate the algae trouble and the stream pollution. The raw water may be by-passed around the plant. There are 20 filters, each 14 feet in diameter and 16 feet high of the Jewel gravity type. The total rated daily capacity of them is 8,000,000 gallons. There are four wooden settling tubs 14 feet in diameter. Chemical solution tanks are provided but they are not used.

Distribution.

The water passes down through three feet of sand and six inches of gravel and the filtrate passes to the clear water basin outside whose storage capacity is 2,300,000.

From this basin a 30 inch supply main follows the Toby Creek valley to Luzerne where it divides into a 12 and 16 inch main. The 12 inch pipe extends northeasterly to Maltby and Dickville in Swoyersville borough and the 16 inch pipe reducing to 14 inches and 12 inches extends southwesterly through Courtdale. Edwardsville and Larksville boroughs to Plymouth borough line. The main supply pipe continues through Luzerne borough to Dorranceton borough at Vaugns Corners where it connects with the mains from Spring Brook and the 24 inch pipe extending under the river at Wilkes-Barre. The gate on this connection, however, is closed. Since 1896, the Huntsville reservoir supply has not been furnished in Wilkes-Barre City, with two exceptions only and then for a few days at a time, due to the breaking of the supply main on the Spring Brook system according to reports made by the water company. The connection with the 12 inch Brook and Susquehanna river water here within a zone of a half a mile or more: but none of the Spring Brook or river water is supposed to reach Kingston or places further south under ordinary conditions.

High Service Districts.

All of the low land in Plymouth borough is supplied with Huntsville water. The borough population is 16,995. In the low district service there are about 13,000 persons. The high service is on the Coal Creek supply, but when this is exhausted water is raised into the high service by a steam pumping engine of 500,000 gallons capacity housed in a station on Downing Street, the supply coming from the pipes in the low services and being Huntsville water It is furnished to about 4,000 persons in Plymouth borough and 1,000 persons on Welsh Hill in Larksville The overflow, if any, goes to Coal Creek reservoir No. 1.

There is an artesian well on the mountain side, the flowing water from which is conducted into a storage reservoir of 150,000 gallons capacity, whence it is supplied through a 4 inch pipe line to about 1,000 inhabitants in East End village, Larksville. It was established in connection with the Coal Creek supply.

Population.

In the following table is given data about the population served by the Toby Creek supply:

Place.	Population.
Regular Low Service.	
Luzerne borough,	5,426
Swoyersville borough,	3,648
Courtdale borough,	1,423
Pringle township,	1,000
Larksville borough (part),	7,800
Edwardsville borough,	7,130
Plymouth borough (part),	13,000
Dorrancton borough,	4,056
Kingston borough,	6,449
	49,922
Auxiliary High Service.	
Larksville (part),	1,488
Plymouth (part),	4,000
Total,	55,410

Quality of Water.

When the Huntsville reservoir gets low, water may be furnished in the district from Spring Brook, from the Susquehanna River to Harvey Creek. In the following table appear the results of analyses by the company's expert:

Year.	Toby Creek		Filtered.		Plymouth Tap.	
	Samples.	B Coli.	Samples.	B Coli.	Samples.	B Coli.
1910,	24	5			3	1
1899,	14	1				
1900,	12	1				
1901,	11	2				
1902,	16	2				
1903,	23	2				
1904,	20	2				
1905,	23	2				
1906,	18	1				
1907,	20	3				
1908,	23	4			5	0
1909,	48	4	8	0	4	1
	252	30	8	0	12	2

During the summer of 1909, the Department collected and analyzed samples of raw and filtered water from Toby Creek, no sewage organisms were found in five samples.

7. Coal Creek Supply.

The Coal Creek system consists of three storage reservoirs and an intake on Coal Creek, and three artesian wells, all lying just north of the borough of Plymouth.

Coal Creek rises in the mountains in Plymouth Township and flows southerly down through the lower end of the borough to the Susquehanna River, a distance of less than three miles and falling in this length over 800 vertical feet. Hence it is a rapid stream. On the creek about one mile below the source at an elevation of 1280 feet above sea level there is a dam storing 6,000,000 gallons of water and having a tributary area of 1.45 square miles. This is known as Reservoir No. 4. The water from it flows into a second storage reservoir one half mile further down stream at an elevation of 1100 feet above sea level. The storage here is 3,000,000 gallons and the tributary drainage area is 2.5 square miles. The basin is known as reservoir No. 3. From it the water flows into a third storage basin known as reservoir No. 2, located immediately below at an elevation of 940 feet above sea level and having a storage capacity of 1.5 million gallons. Its total tributary drainage area is 3.47 square miles.

The Coal Creek intake lies almost a half mile below No. 2 storage reservoir on the western outskirts of Plymouth borough. Its elevation is 815 feet above sea level. The storage capacity is 1,000,000 gallons only and the total drainage area above it is 4.07 square miles. This watershed is uninhabited. The flow of the stream is largely depended upon to supply the district. There are two artesian wells emptying into the creek between dams No. 1 and No. 2, and there is an artesian well above dam No. 4. Their combined flow is inconsiderable except in wet weather.

There are two artesian wells on the mountain side in or near Larksville borough. One has been acquired by the Shawnee Spring Water Company. The water is bottled and sold in the city. The water from the other well is conveyed to a storage reservoir of 150,000 gallons capacity from whence it is piped to the village of Lowertown in Larkesville locally known as the "East End" where about 240 families are supplied.

From the intake dam a 12 inch pipe reducing to 6 inches in diameter leads into Plymouth where it connects with the lines laid in the streets on the hillside extending to Welch Hill in Larksville. There are also normally connections with the low service pipes in the borough supplied normally with Huntsville water. The district contains 4,000 persons in Plymouth and 1488 persons in Welch Hill. There are about 1000 inhabitants in Lowertown or the "East End." The system was built by the Plymouth Water Company. As already explained when Coal Creek water fails Huntsville water is pumped into the mains at the Downing Street station.

In 1885, an epidemic of typhoid fever occurred in the borough of Plymouth continuing through the Spring and Summer, totaling 1,104 cases and 114 deaths. The cause of the catastrophe was located on the mountain slope in a house situated almost immediately on the bank of Coal Creek between the third and fourth reservoir. Here a patient, contracting typhoid when on a visit to Philadelphia, had for many weeks been seriously ill with typhoid fever. The dejecta without any attempt at disinfection, were deposited at the top of the high bank at the bottom of which was the stream supplying Plymouth with drinking water. When the rains came they washed the poison into the swift flowing brook from whence the infection was distributed wherever the public water was used. The later cases were, in a great measure, due to secondary infection. Non-disinfection of stools and careless disposition of excreta prevailed in the borough in spite of the exigencies and warnings. The people through fear to the public supply had recourse to old wells which were so located on the hillside as to receive the precolating poison of nearby cesspools or by direct surface pollution. So well water was one of the chief avenues of secondary infection.

The lessons taught are pertinent. Infection can come originally from a distant city and be brought to a community by one individual From one single source of pollution on a watershed, otherwise uninhabited, may result a contamination sufficiently virulent to fatally infect the water supply of the whole town located miles away. Improper disposal of household drainage in the town is a public menace to the health of the entire community, more especially in the presence of an epidemic.

The water company soon acquired the two dwellings on the watershed and removed them.

Harvey's Creek Supply.

Harveys Creek system consists of a storage reservoir on Pike Creek, a tributary an intake dam on Harveys Creek, a pumping station in Nanticoke borough, a distributing reservoir in Newport Township and a distributing pipe system.

Harveys Creek rises in Harveys Lake at an elevation of 1,226 feet above mean sea level and thence it flows in a general southerly direction through Lake, Lehman, Jackson, and Plymouth townships to the Susquehanna River, opposite Nanticoke borough, a length of about 12 miles in which it falls a vertical distance of 700 feet. The stream penetrates its way through the Shawnee Mountain by means of a very deep narrow tortuous gorge. It is in this gorge at a point about 15 miles from the river at an elevation of 644 feet above mean sea level that the intake dam is located. It is a low masonry structure designed to divert the water into the supply mains. Above this dam the watershed comprises 47 square miles of steep rugged farming country. Below Harveys Lake on the watershed there are 581 dwellings and a population of 1595 including those who reside on the Pike Creek drainage area. On this area below the new reservoir there was a case of typhoid fever, Morgan Cease, this current season, date of onset being August 20th. Agents of the water company and of the Department maintained a supervision of the property to prevent any contamination of the water.

Harveys Lake, area one square mile, is a summer resort around whose shores extends a State Highway fringed with summer cottages, extensive picnic grounds, hotels and restaurants. The permanent population is about 800, (301 estates) but thousand congregate for single days in the season. On the area tributary to the lake there were three cases of typhoid fever this summer, that of W. H. Long, July 19th, and that of Rachael Long, July 22nd, both of Alderson Lake Township; also that of Herbert Gosart, Sept. 1st. The Long home was closed and the patients taken to the city hospital.

From the said intake dam an 18 inch line and a 14 inch line of pipe extend down the gorge to the village of West Nanticoke along the river bank in the township and thence they pass under the river and about one half mile in the borough to the pumping station located above the Susquehanna. The intake is 110 feet only above the low part of the borough, hence all of the water is raised by the pumps with one exception. West Nanticoke is all on the 14 inch main from the dam. That part of this pipe in the river is not used.

The installation in the pump house consists of four 1,500,000 gallon pumps. There is a high and low service. Both the high and low district pumps are operated continuously and deliver the water directly into the street pipe system. The total daily consumption is about 3,000,000 gallons approximately one half is pumped into the low pressure system which serves the business part of Nanticoke and the collieries there, and the other half is pumped into the high pressure system which serves the hill, and Glen Lyon, Sheatown, Lee Mine and Alden villages in Newport township and Avondale into Plymouth borough.

On the high service at the end thereof is an open storage reservoir in Newport Township, 2.6 miles west of the pump house and between Nanticoke and Glen Lyon. The reservoir is 21 feet deep and holds 19,300,000. Its high water mark is 281 feet above the pumps at an elevation of 615 feet above sea level. From this reservoir a 14 inch main reducing to 10 inch and 8 inch extends to Glen Lyon.

The force main to it is 14 inches in diameter and the force mains to Avondale and Plymouth are 12 inches and 14 inches in diameter.

Pike Creek rises in the North Mountain in Lake Township and flows southerly for a distance of eight miles joining Harveys Creek about 2.5 miles above the intake dam. On this stream three quarters of a mill above its mouth an earth embankment core wall dam is being erected which will, when completed, pond up water to a maximum depth of 51.25 feet and store 2,624,621,000 gallons at the elevation of 1048.22 feet above sea level and with two feet of flash boards 275,000,000 additional gallons of water can be impounded. The area flooded will be 384 acres. The tributary area is 10.33 square miles. It is a rolling farming country, containing an estimated population of 465 persons.

It is the intention of the North Mountain Water Supply Company to build an intake reservoir for high pressure service on Pike Creek below the storage reservoir and to deliver the water into it by means of three 30 inch discharge pipes at the big dam and the open channel of the creek.

There is a new gravity main consisting of 15,000 feet of 20 inch pipe and the remainder of 18 inch pipe laid from the new reservoir along the creek and under the river at Nanticoke pumping station. This line connects to the pipes leading to Plymouth borough and the new 24 inch main extending under the river at Plymouth into Hanover Township, there connecting with the 24 inch Richard Island force main.

In the following table is given the distribution of the population supplied with Harveys Creek water during the current season:

Place.			Population.
Nanticoke borough,			18,877
Newport township,	Glen Lyon village,	4,000	
	Alden village,	2,000	
	Sheatown, Lee Mine,	1,500	7,500
Plymouth township,	West Nanticoke,	2,000	
	Avondale,	500	2,500
			28,877

During the summer of 1905, following a case of typhoid fever at the Hoover farm on the watershed and the attending infection of the public water supply, there were 531 cases of typhoid fever and 50 deaths among the consumers in the Nanticoke Water Company's district. Glen Lyon was the only place exempted. The Newport reservoir intercepted the typhoid infection and proved a sufficient barrier to save the latter place from the scourge. Since that time and up to the present date all the water has been treated with a solution of copper sulphate before being delivered into the water works system by order of the Commissioner of Health. There is a caretaker living at Pike's Creek reservoir He has telephone communication.

Little Wilkes-Barre Mountain Supply.

The Little Wilkes-Barre Mountain range is a continuation southwesterly beyond Solomon's Gap of the Wilkes-Barre Mountains. And through this range there is a series of small gaps down which streams flow from the higher summits of the Penobscot Mountain range which mark the southern boundry of Hanover and Newport townships. On three of these runs there are storage reservoirs and intake dams.

Sugar Notch Reservoir and Intake.

Sugar Notch Run is a small stream flowing through the southeastern corner of Sugar Notch borough and a part of Hanover township and joining Solomon's Creek in Ashley borough. On this stream about half a mile above the borough line of Sugar Notch there is a small intake dam elevated 930 feet above sea level. It has an unoccupied drainage area of 1.35 square miles and ponds up not over 20,000 gallons, so it serves merely to divert the flow into the storage basin not many hundred feet distant and 15 vertical feet lower, located at the head of a tributary of Warrior Run. This reservoir holds 5,000,000 gallons and has a watershed of 25 acres. Hence it is dependent entirely from the flow of Sugar Notch Run and when this flow is greatly reduced, water from Crystal Lake may be admitted by means of a pipe line along the mountain side terminating at the edge of the watershed near the beginning of the run. There is an artesian well at the Sugar Notch storage reservoir from which water flows to the basin. A 12 inch pipe line leads from the dam to Sugar Notch borough, Warriors Run borough and Hanover village in Nanticoke borough. Warriors Run is the boundary between Warriors Run aud Sugar Notch boroughs and it flows directly north to the Susquehanna River.

Hanover Reservoir and Intake.

Nanticoke Creek has numerous tributaries in the mountain which are gathered into the main stream which flows through Hanover township and enters the Susquehanna River in Nanticoke borough above the dam. On one of the tributaries about one mile south of Hanover village in Nanticoke borough at an elevation of 1,058 feet above sea level with an unoccupied watershed of 0.46 square miles, is a reservoir capable of storing 4,000,000 gallons of water. A short distance down stream and at an elevation 171 feet lower is an intake dam ponding back 50,000 gallons from which a 6 inch pipe line leads to the village and connects with the main from Warriors Run.

Wanamie Reservoir and Intake.

Newport Creek flows easterly through Newport Township and Nanticoke borough to the river. It has numerous tributaries and on one of these flowing through Wanamie village there is a storage reservoir in the mountain of 10,000,000 gallons capacity. The watershed here is 0.77 squares miles of uninhabited land. About 1000 feet further down the stream at an elevation of 810 feet above mean sea level there is an intake dam having a total area of 0.91 square miles and ponding up 50,000 gallons of water. An 8 inch pipe line about a mile long reducing to 6, 4 and 3 inches, leads to and through the village. The pipes were not connected with any other system until recently. Water from Nanticoke can be supplied from Hanover village, so it is reported. Also to Aldan, although the Alden Coal Company furnishes water to its own plant and to many of the dwellings of the settlement when there is an abundance. This village lies at the foot of the mountain between Wanamie and Nanticoke.

The distribution of population reached by the Little Wilkes-Barre Mountain supply is shown in the following table:

Place.	Estimated Population.
Sugar Notch borough,	2,437
Warrior Run borough,	1,251
Hanover village (Nanticoke borough),	1,800
Wanamie village (Hanover township),	1,700
	7,188

In the following table are given the results of the analyses of the waters by the water company's expert. They cover the years 1899 to 1907 exclusive.

Year.	Wanamie		Hanover.		Sugar Notch.	
	Analyses.	B. Coli.	Analyses.	B. Coli.	Analyses.	B. Coli.
1899,	1	0	1	0	1	0
1900,	1	1	-----	-----	-----	-----
1901,	1	0	-----	-----	-----	-----
1902,	4	0	1	0	3	0
1903,	2	0	2	0	2	0
1904,	2	0	-----	-----	1	0
1905,	3	0	2	0	-----	-----
1906,	2	0	1	0	1	0
1907,	5	0	-----	-----	-----	-----
	21	1	7	0	8	0

PART II.

The Distribution of Typhoid Cases in Wyoming Valley, Season 1910, and the Relation to the Public Water Supply.

1. General.

The distribution of the typhoid fever cases throughout the Wyoming Valley for the season of 1910 between July 1st and October 1st, is given in the following table by municipalities alphabetically arranged.

Municipality.	No. of Cases.	Population.
1. Ashley borough,	2	5,001
2. Avoca borough,	12	4,634
3. Dorranceton borough,	6	4,046
4. Duryea borough,	2	7,484
5. Edwardsville borough,	7	7,130
6. Forty Fort borough,	2	2,353
7. Hanover township,	5	6,964
8. Jenkins township,	5	5,000
9. Kingston borough,	5	6,449
10. Kingston township,	6	1,049
11. Larksville borough,	8	9,288
12. Luzerne borough,	13	5,426
13. Miners Mills borough,	2	3,150
14. Moosic borough,	5	3,963
15. Nanticoke borough,	2	18,877
16. Newport township,	2	10,277
17. Old Forge borough,	6	11,326
18. Parsons borough,	14	2,587
19. Pittston city,	7	16,262
20. Plymouth borough,	8	16,995
21. Sugar Notch borough,	2	2,437
22. Swoyersville borough,	9	3,648
23. Warrior Run borough,	3	1,251
24. Wilkes-Barre city,	149	67,105
25. Wilkes-Barre township,	1	5,702
26. Wyoming borough,	2	3,010
	285	232,023

This distribution of cases does not appear on the face to indicate a general water borne infection and the more the details are studied, the more the indication becomes a conclusion. There were 285 cases occurring in 26 municipalities, out of 41 municipalities in the valley. These places did not receive the same water but they were furnished with water from the numerous sources hereinbefore described. Only one of the 41 places did not receive public water, namely, Kingston Township.

Cases by Systems of Water Supply.

Pursuing the inquiry further and grouping the cases by the systems of water supply, the facts appear as shown in the following table:

Supply.	Typhoid Cases.	Population.
Spring Brook,	112	103,905
Covey reservoir,	0	5,000
Falling Springs,	0	9,000
Wilkes-Barre Mountain,	46	24,387
Crystal Lake and Pine Run,	55	36,600
Toby Creek,	45	49,922
Coal Creek,	11	5,488
Harveys Creek,	4	28,877
Little Wilkes-Barre Mountain,	6	7,188
	279	270,457

Six cases occurred in Kingston Township, but that district is not supplied by public water. We may eliminate from further discussion, so far as suspicion points to the sources as possible agencies in the transmission of the disease, the Covey reservoir, Falling Springs, Harvey Creek and Little Wilkes-Barre Mountain supplies, based on the information appearing in the above table:

Spring Brook System.

Taking up the remaining supplies in order, the facts about the distribution of cases in the Spring Brook supply district are stated in the following table:

Distribution of Cases in the Spring Brook Supply District.

Municipality.		Estimated district population.	Cases by Service.	
Number of towns having typhoid.	Name.		Spring Br. direct.	Spring Br. and river.
1	Moosic borough,	1,600	5	----------
	Taylor borough (part),	6,561	0	----------
2	Old Forge borough (part),	10,026	6	----------
3	Duryea borough,	7,484	2	----------
4	Avoca borough,	4,634	12	----------
	Pittston township (part),	1,900	0	----------
5	Pittston city,	16,262	7	----------
6	Jenkins township (part),	1,500	4	----------
	West Pittston borough,	6,348	----------	0
	Exeter borough,	3,537	----------	0
7	Wyoming borough,	3,010	----------	2
	West Wyoming borough,	1,621	----------	0
8	Forty Fort borough,	2,535	----------	2
9	Wilkes-Barre city (part),	33,000	----------	64
10	Parsons borough (part),	2,000	----------	6
11	Miners Mills borough (part),	1,659	----------	1
12	Hanover township (part),	Few.	----------	1
		104,300	36	76

While the total of 112 cases on Spring Brook might look large at first, after studying the above table and the descriptions of the water works systems in the different towns comprising the Spring Brook district, the outbreak does not look like water infection. Naturally the district nearest the intake and source would have received the infection first and there would have been numbers of generally distributed cases had the water been the cause. In fact there were no cases reported in Taylor borough and none in Pittston township and two only in Duryea and seven only for Pittston city and four for Jenkins township or a total of 13 cases in five separated municipalities whose total population comprised 70 per cent. of the persons living in the territory furnished by Spring Brook water direct. In the other 30 per cent. of territory, by population, there were 23 cases grouped in such a way as to point to some other origin than the public water.

Again with respect to the river water, the pumps were put in commission July 13th. Most of the typhoid fever cases supplied with mixed river and Spring Brook water occurred subsequent to this date. There is no controlling reason why the river water might not have been a medium of transmission, so far as is shown. However, it is extremely significant that those places first receiving this water were exempt. West Pittston, Exeter, and West Wyoming boroughs have been free from the disease all the season. Wyoming borough had two cases but they occurred before July 13th and Forty Fort had one case before July 13th, and one since. Hence one case only occurred in the territory comprising 32 per cent. of the entire population receiving river water and receiving it first. Had the public supply been infected, naturally the typhoid outbreak would have numbered many victims in these towns first receiving the river water.

In the remaining territory, comprising 64 per cent. by population, receiving mixed Spring Brook and River water, and receiving it last 72 cases of typhoid fever occurred during the season of which 27 per cent of the patients contracted the disease prior to the starting of the pumps. The Miners Mills case and all of the Parsons borough cases were due to the infection contracted before the pumps were started.

Detailed investigations of the 64 city cases showed 13 instances where the disease started before July 13th and many other instances where the origin was not public water.

2. Wilkes-Barre Mountain System.

The facts about the distribution of cases in the Wilkes-Barre Mountain Supply district are stated in the following table:

Distribution of Cases in the Wilkes-Barre Mountain Supply District.

Municipality.		Estimated district population.	Cases by Service.		
No. of towns having typhoid.	Name.		Laurel Run direct or with Mill Creek.	Mill Creek direct.	Gardners Creek, direct.
1	Laflin borough,	300			0
	Jenkins Township.				
	Inkerman village,	1,000			1
	Plains Township:				
	Plains,	2,500			0
	Plainsville and vicinity,	1,500			0
	Midville and vicinity,	1,500			0
	Hudson,	1,500		0	
2	Miners Mills borough (part),	1,500		1	
3	Parsons borough (part),	587	8		
4	Wilkes-Barre city (part),	14,000	36		
		24,387	44	1	1

A study of the information in the above table will eliminate from suspicion Mill Creek water and Gardners Creek water. In the district supplied directly from Mill Creek there was one case of typhoid fever only in a population of 2600. In the district supplied with Gardners Creek water there was one case only among a total population of 6800.

In the district supplied with Laurel Run water (mixed with Mill Creek water,) there were 44 cases among a population of 14,587. The dates of onset of these cases are given in the following table:

Dates of Onset of Typhoid Cases in Laurel Run District.

Days of Month.	Cases.			
	June.	July.	August.	September.
1,			3	
2,		1	2	
3,			1	
4,	1		1	1
5,				
6,				8
7,		2	2	2
8,			1	2
9,				
10.			2	1
11,		1		
12,				
13,			3	1
14,				
15,				
16,			1	

Dates of Onset of Typhoid Cases in Laurel Run District—Continued.

Day of Month.	Cases.			
	June.	July.	August.	September
17,			1	1
18,				
19,				1
20,			1	
21,		1		
22,				
23,				
24,		2		
25,				
26,			2	
27,			1	
28,				
29,				
30,	1	1		
31,			1	
	2	9	23	10

The eight cases in Parsons borough are of unknown origin. It seems probable that if the public water had been the cause, more cases would have been reported. In one house on Gravel Hill there were four cases The first patient was a boy 14 years old. He played about the streets and came down with typhoid on August 13th. The cesspool overflowed into the yard and in the cellar. There was no disinfection on the property. Three other children in the same household came down with the disease on September 4th, 6th and 8th and on September 10th a 12 year old boy in the neighborhood, who knew and played with the others afflicted became a victim.

Two city cases in June, 7 in July, 22 in August and 5 in September, do not offer the appearance of an outbreak entirely due to public water. They were scattered as the above table will show throughout the months and a number were known to have been in all probability caused by a secondary infection.

The circumstances in connection with every case as far as they could be ascertained were carefully studied. To the attendance at Harveys Lake picnics may be attributed two cases, to secondary infection 8 cases, to bathing in the river near a sewage outlet one case, to importing to the city a case after the patient had contracted the infection elsewhere, one case, to milk from a dairy known to be supplied from a farm on which there was typhoid fever through which infection was spread to neighbors of the farmer, may be attributed nine cases and possibly seven others, and to unknown causes, eight cases. At least 12 of the 36 cases are satisfactorily accounted for leaving 24 cases, of which 16 may have been of milk origin. On the supposition that they were not, there would then be 24 cases which might have been caused through infection from the public water supply.

As previously shown, Laurel Run watershed is a dangerous one from which to take a source of drinking water The storage in the intermediate service reservoir in use during the season under discussion is limited and a week or less is the reported time in which the rate of consumption in the district would draw off the reservoir contents Undoubtedly some of the water would go through in much less time. The infection of Laurel Run may have occureed and sedimentation would have offered a barrier to its progress through the reservoir. Thus a small volume of contaminated water only might have gotten into the pipe system at any one time, to which might be attributed the 24 cases. Such a weak infection would not likely cause an explosive outbreak;

it would more naturally be manifested in a sporadic appearance of the disease in the district, such as did occur. The 24 cases by months in the Laurel Run district were as follows:

June	1
July	4
August	17
September	2

It does not seem probable that a water infection would persist from the fourth day of June to the thirtieth day of September without producing more than 23 cases, under the circumstances. The 17 cases in August largely occurred in the first ten days and 8 of these patients received milk from the same source which was under suspicion. In fact, 12 of the 17 cases were in this category.

3. Crystal Lake and Pine Run System.

The facts about the distribution of cases in the Crystal Lake and Pine Run supply district are stated in the following table:

Distribution of Cases in the Crystal Lake and Pine Run Supply District.

Municipality.		Estimated district population.	Cases by Service.		
			Crystal Lake and Pine Run.		
No. of towns having typhoid.	Name.		Intermediate.	High.	River pumps.
1	Ashley borough,	5,000	2	----------	----------
2	Hanover township (part),	2,500	3	----------	----------
3	Wilkes-Barre township (part),	4,000	1	----------	----------
4	Wilkes-Barre city (part),	20,000	49	----------	----------
	Laurel Run borough (part), Wilkes-Barre township (part),	1,000	----------	0	----------
	Hanover township (part),	3,500	----------	----------	
		33,600	55	0	

Keeping in mind the description hereinbefore given of the sources of the Crystal Lake and Pine Run system, from a glance at the above table it appears that the typhoid fever in the district could not have been due to water infection. Ashley borough received the water first as did also the high service district. The latter was free from typhoid fever and the former had two cases only. Hanover Township and Wilkes-Barre Township next received the water and in these places there were three cases and one case only, respectively. That part of Hanover township on the pumping service supplied with Richards Island water was also free from typhoid. But in that part of Wilkes-Barre city receiving Crystal Lake and Pine Run water, comprising 54 per cent. of the entire population in the Crystal Lake and Pine Run territory, there were 49 cases or 90 per cent. of all the cases in said territory. This fact is significant particularly since the city district is at the remote end of the water district. The only sane conclusion to be reached under these circumstances is that some other origin than that of water was the cause of the fever. Had it been the water, those places first receiving it would have been affected.

4. Toby and Coal Creek Systems.

The facts about the distribution of cases in the Toby Creek and Coal Creek supply districts are stated in the following table:

Distribution of Cases in the Toby Creek and Coal Creek Supply Districts.

Municipality.		Estimated district population.	Cases by Service.	
No. of towns having typhoid.	Name.		Low service, Toby creek.	High service, Coal creek.
1	Luzerne borough,	5,426	13	
	Courtdale borough,	1,423	0	
	Pringle township,	1,000	0	
2	Swoyersville borough,	3,648	9	
3	Larksville borough (part),	7,800	1	
4	Dorranceton borough,	4,046	6	
5	Kingston borough,	6,449	5	
6	Edwardsville borough,	7,130	7	
7	Plymouth borough (part),	13,000	4	
8	Larksville borough (part),	1,488		7
9	Plymouth borough (part),	4,000		4
		55,410	45	11

On Toby Creek watershed below the Huntsville reservoir but above the water works intake, there were 5 cases of typhoid fever occurring at the Billings farm. This is the only instance, excepting the Harveys Creek, where typhoid fever was found to exist on a watershed supplying water to the public in the Wyoming Valley. This statement does not refer to the Susquehanna River.

The Department's investigations were first directed to the Toby Creek district on this account. However, the suspicion that this water supply might have been polluted and thus spread the typhoid infection was soon allayed. While Luzerene borough, which received the water first, had to report 13 cases, Courtdale and Pringle Township, next receiving the water, had no cases to report and Larksville, one only, although these three places contain nearly twice the number of inhabitants of Luzerne.

The 13 Luzerne cases are all satisfactorily accounted for excepting two. One case was imported from White Haven. Another case was thought to have been contracted by an excursionist who brought it home to Luzerne where subsequently there were four other cases in the family directly attributable to household contagion. In like manner, Michael Marsay, contracting the disease from an unknown source, brought it into the Woodich family, in which there were subsequently 5 other cases. So nine of Luzerne's cases were secondary, 2 were imported and 2 were unknown origin.

The nine Swoysville cases are accounted for as follows: Six were secondary, and three were of unknown origin.

Of the six Dorranceton cases, 2 were imported, 2 were secondary and 2 were of unknown origin.

Of the Kingston cases, 3 were imported, 1 was secondary and 1 was of unknown origin.

Of the 7 Edwardsville cases, 2 were secondary and 5 were of unknown origin. Two of the latter were males, 20 and 26 years old, who went about freely, and one was a young woman, 17 years of age, who frequented picnics. The other two were children, one of whom was cared for at the City Charity Rooms, while the mother was in jail for drunkenness or other misdemeanor. Furthermore 4 patients were widely separated in the borough and there were no other victims in their families or the neighborhood.

Of the 8 cases in Plymouth borough 4 were on the high service and 4 were on the low service. Two of the latter were imported, one was secondary and 1 was of unknown origin. One of the high service cases was secondray and 3 were of unknown origin, although one was thought to have been imported. In any event the circumstances were such as to divert suspicion of the public water.

There were 7 typhoid patients in the Larksville high service district and one in the low service district. These would not have been caused by water unless other cases in the territory supplied with Toby Creek water were due to water. A study of the circumstances shows 6 of the cases to have been secondary.

5. Review of Distribution of Cases in Wyoming Valley.

The classification of the origin of these typhoid cases arranged in order of onset is given in the following table:

CLASSIFICATION OF ORIGIN OF TYPHOID.

Date.	No. of cases.	Unknown.	Milk	Secondary.	Imported.	Miscellaneous.	Total.	
May 7	1	1 Plymouth,					1	
May 11	2	1 Plymouth,			1 Plymouth,		2	
May 13	1	Newport,					1	
May 23	1	1 Wyoming,					1	
May 25	1	1 Swoyerville,					1	
May 28	1				1 Pittston City,		1	7
June 4	1	1 Wilkes-Barre,					1	
June 5	1				1 Wilkes-Barre,		1	
June 9	1	1 Parsons,					1	
June 10	1		1 Avoca,				1	
June 12	1			1 Wyoming,			1	
June 14	1	1 Dorranceton,					1	
June 15	1	1 Swoyerville,					1	
June 20	3	1 Luzerne,						
		1 Forty Fort,		1 Wilkes-Barre,			3	
June 21	1	1 Parsons,					1	
June 26	1	1 Swoyerville,					1	
June 29	1			1 Swoyersville,			1	
July 1	5	1 Moosic,	2 Moosic,	1 Dorranceton,	1 Wilkes-Barre,		— 5	13
July 2	1			1 Larksville,			1	
July 4	7	1 Duryea,	2 Avoca,	1 Wilkes-Barre,			7	
		1 Sugar Notch,	2 Wilkes-Barre,					
July 5	1	1 Newport,					1	
July 6	3			1 Miners Mills,			3	
				1 Swoyersville,				
				1 Larksville,				
July 7	2	1 Wilkes-Barre,				1 Wilkes-Barre,	2	
July 8	1		1 Avoca,				1	
July 9	2		1 Avoca,				2	
			1 Wilkes-Barre,					
July 10	1		1 Wilkes-Barre,				1	
July 11	1	1 Parsons,					1	

CLASSIFICATION OF ORIGIN OF TYPHOID.

Date.	No. of cases.	Unknown.	Milk.	Secondary.	Imported.	Miscellaneous.	Total.
July 12	4	2 Kingston Twp.,	1 Old Forge,	1 Swoyerville,			4
July 13	2		1 Duryea,				2
			1 Wilkes-Barre,				
July 14	3	1 Parsons,	1 Wilkes-Barre,				3
		1 Wilkes-Barre,					
July 15	5		1 Old Forge,				5
			1 Moosic,	1 Larksville,			
		1 Wilkes-Barre,	1 Wilkes-Barre,				
July 16	3			2 Larkesville,	1 Wilkes-Barre,		3
July 17	2	1 Parsons,	1 Wilkes-Barre,				2
July 18	2			1 Swoyersville,			2
July 19	2	1 Parsons,	1 Wilkes-Barre,	1 Plymouth,			2
July 20	5		1 Pittston,	1 Kingston Twp.,			5
			3 Wilkes-Barre,				
July 21	4	1 Parsons,		1 Luzerne,			4
		1 Edwardsville,		1 Kingston Twp.,			
July 22	2	1 Plymouth,		1 Swoyerville,			2
July 23	4	1 Wilkes-Barre,	1 Avoca,				4
			2 Wilkes-Barre,				
July 24	6		2 Wilkes-Barre,	1 Parsons,			6
				1 Wilkes-Barre,		2 Wilkes-Barre,	
July 25	8	1 Wilkes-Barre,					8
			6 Wilkes-Barre,			1 Luzerne,	
July 27	4	1 Miners Mills,	1 Wilkes-Barre,				4
		1 Edwardsville,				1 Wilkes-Barre,	
July 28	1					1 Wilkes-Barre,	1
July 29	3		2 Wilkes-Barre,				3
				1 Pittston,			
July 30	5	1 Edwardsville,					5
			2 Wilkes-Barre,	1 Wilkes-Barre,	1 Plymouth,		
July 31	3	1 Wilkes-Barre,	2 Wilkes-Barre,				3
							92

Aug. 1	14	1 Avoca,	6 Wilkes-Barre,				14
		1 Old Forge,					
		1 Jenkins Twp.,					
		1 Hanover Twp.,					
		1 Forty Fort,					
		1 Plymouth,					
		2 Wilkes-Barre,					
Aug. 2	4		2 Wilkes-Barre,			2 Wilkes-Barre,	4
Aug. 3	3	1 Kingston,					3
			2 Wilkes-Barre,				
Aug. 4	4	2 Wilkes-Barre,					4
			1 Old Forge,				
			1 Wilkes-Barre,				
Aug. 6	4	2 Wilkes Barre,				1 Wilkes-Barre,	4
			1 Wilkes-Barre,				
Aug. 7	4	1 Wilkes-Barre,		1 Sugar Notch,			4
			2 Wilkes-Barre,				
Aug. 8	2		1 Wilkes-Barre,				2
				1 Hanover Twp ,			
Aug. 9	1					1 Kingston Twp.,	1
Aug. 10	6	1 Wilkes-Barre,	1 Warrior Run,			1 Wilkes-Barre,	6
			3 Wilkes-Barre,				
Aug. 11	4		1 Wilkes-Barre,	1 Avoca,		2 Wilkes-Barre,	4
Aug. 12	2		1 Wilkes-Barre,			1 Wilkes-Barre,	2
Aug. 13	6	1 Wilkes-Barre,	1 Wilkes-Barre,				6
		1 Parsons,	1 Avoca,		1 Wilkes-Barre,	1 Wilkes-Barre,	
Aug. 14	4		2 Wilkes-Barre,		1 Kingston,	1 Wilkes-Barre,	4
Aug. 15	6	1 Wilkes Barre,		1 Dorranceton,		3 Wilkes-Barre,	6
			1 Wilkes-Barre,				
Aug. 16	2	1 Wilkes Barre,		1 Wilkes-Barre,			2
Aug. 17	3	1 Wilkes-Barre,					3
			1 Wilkes-Barre,		1 Kingston,		
Aug. 18	3	1 Ashley,				2 Wilkes-Barre,	3
Aug. 19	4	1 Jenkins Twp.,					4
		1 Wilkes-Barre,	2 Wilkes-Barre,				
Aug. 20	6	1 Avoca,	3 Wilkes-Barre,			1 Pittston,	6
		1 Wilkes-Barre,					
Aug. 21	5	1 Avoca,	1 Moosic,				5
		1 Wilkes Barre,					
			1 Avoca,				
			1 Wilkes-Barre,				4
Aug. 22	4	1 Lakeville,					
		1 Wilkes-Barre,	1 Wilkes-Barre,		1 Dorranceton,		4
Aug. 23	6	1 Wilkes-Barre,		2 Luzerne,		1 Wilkes-Barre,	6
			1 Wilkes-Barre,			1 Pittston,	

CLASSIFICATION OF ORIGIN OF TYPHOID.

Date.	No. of cases.	Unknown.	Milk.	Secondary.	Imported.	Miscellaneous.	Total.
Aug. 24	4	1 Old Forge,	3 Wilkes-Barre,				4
Aug. 25	1	1 Jenkins Twp.,					1
Aug. 26	3		1 Wilkes-Barre,			2 Wilkes-Barre,	3
Aug. 27	6	1 Old Forge, 1 Jenkins Twp., 1 Edwardsville,	1 Wilkes-Barre,			1 Wilkes-Barre, 1 Pittston,	6
Aug. 28	5	1 Nanticoke, 1 Dorranceton, Wilkes-Barre,	1 Wilkes-Barre,	1 Luzerne,			5
Aug. 30	4	1 Nanticoke, 1 Wilkes-Barre, 1 Swoyerville,			1 Dorranceton,		4
Aug. 31	2	1 Wilkes-Barre twp.,	1 Wilkes-Barre,				2 — 122
Sept. 1	4	1 Larksville, 1 Wilkes-Barre,			1 Luzerne, 1 Kingston,		4
Sept. 2	1					1 Wilkes-Barre,	1
Sept. 3	2			1 Larksville, 1 Wilkes-Barre,			2
Sept. 4	3			1 Parsons, 1 Wilkes-Barre, 1 Pittston,			3
Sept. 5	2					1 Wilkes-Barre, 1 Wilkes-Barre,	2
Sept. 6	6	1 Jenkins Twp., 1 Parsons,		1 Parsons, 1 Wilkes-Barre,	1 Hanover, 1 Wilkes-Barre,		6
Sept. 7	5	1 Luzerne,		2 Wilkes-Barre, 1 Kingston Twp.,		1 Wilkes-Barre,	5
Sept. 8	3		1 Wilkes-Barre,	1 Parsons, 1 Luzerne,			3
Sept. 10	3			1 Parsons, 1 Ashley, 1 Luzerne,			3
Sept. 11	2	1 Wilkes-Barre,		1 Warrior Run,			2
Sept. 12	3	1 Edwardsville, 2 Wilkes-Barre,					3

Sept. 13	1	1 Wilkes-Barre,					1	
Sept. 14	2	1 Hanover,		1 Warrior Run,			2	
Sept. 15	2		1 Wilkes-Barre,		1 Wilkes-Barre,		2	
Sept. 16	2	1 Hanover,				1 Wilkes-Barre,	2	
Sept. 18	3		1 Wilkes-Barre,			1 Wilkes-Barre,	3	
				1 Kingston,				
Sept. 19	1			1 Luzerne,			1	
Sept. 20	2			1 Edwardsville,			2	
				1 Plymouth,				
Sept. 23	1			1 Edwardsville,			1	
Sept. 24	2	1 Wilkes-Barre,		1 Luzerne,			2	
Sept. 25	1			1 Luzerne,			1	51
Totals,	285	90	90	55	16	34		285

6. Recapituation.

Date.	No. of cases.	Unknown.	Milk.	Secondary.	Imported.	Miscellaneous.	Total.
May,	7	5	--------	--------	2	--------	7
June,	13	8	1	3	1	--------	13
July,	92	22	41	20	3	6	92
August,	122	42	45	8	5	22	122
September,	51	13	3	24	5	6	51
Totals,	285	90	90	55	16	34	285

Miscellaneous cases comprise those whose orgin is attributed to bathing, boating or washing in the river, picnics at Harveys Lake, in the use of the Vulcan Spring, ice cream and cases which were doubtful or found to have been erroneously reported as typhoid fever. Particular reference to the details of such cases and also with respect to imported cases, secondary cases, and those charged to milk infection is made in Part III of the report and in Part IV.

As already stated, there is no reason why water might not have been the vehicle for transmission of the disease. The Susquehanna River water, the Wilkes-Barre Mountain supply, particularly that of Laurel Run, and the Toby Creek supply are considered dangerous because of the potentiality of these waters to become infected. However, the distribution of the typhoid fever cases as previously explained in detail does not to a careful observer warrant the conclusion that the public water supply was the absolute cause of the prevalence of the disease.

Part III.—Immediate Measures Taken for the Protection of the Sources of the Water Supply.

1. At West Pittston Pumping Station.

The river supply served from the West Pittston pumping station was considered to be unsafe. The Commissioner of Health forthwith notified the water company to temporarily treat this water and to install apparatus for this purpose which was done and the company was ordered to prepare plans for permanent works to purify and render at all times pure and wholesome such waters drawn from the north branch of the Susquehanna River.

The following is a copy of the letter:

"Harrisburg, Pa., August 13th, 1910.

"The Spring Brook Water Supply Company,
"Wilkes-Barre, Pa.

"Gentlemen:—I, Samuel G. Dixon, Commissioner of Health of the Commonwealth of Pennsylvania do hereby request you to forthwith install necessary apparatus at the West Pittston pumping station of your system for the temporary treatment of the water being drawn from the North Branch of the Susquehanna River and supplied in your charter territory.

"Furthermore, you are requested to first submit for approval to the State Department of Health plans and a description of the apparatus and process of treatment of the water which it will be proposed by you to put into use in compliance with this request.

"And, finally, you are requested to at once prepare plans for permanent works to purify and render at all times pure and wholesome such waters drawn from the North Branch of the Susquehanna River as you may supply to any of your consumers, and to submit these plans to the Department for approval."

2. Analysis of Spring Brook Water.

Six of the 23 samples collected by the Department at different points in the district of the Spring Brook supply showed B. Coli. One of them was at the Spring Brook intake, another at the West Pittston pumping station and one from tap in Wilkes-Barre two from a tap in Pittston city and one from a tap in Exeter borough. On request the water company employed an expert to devise plans for the installation of apparatus for the treatment of the water at the Spring Brook intake.

In the following table is given the results of the analyses:

Bacteriological Analysis by State Department of Health of Spring Brook Supply Collected at Different Points.

Date of collection	Place.	Bacteria per c.c.	
		Total.	B. Coli.
	Raw Water:		
Aug. 25	Spring Brook intake,	26	4
Aug. 25	River at intake W. Pittston Pumping Station,	50	0
Aug. 25	The sample from pump W. Pittson Pumping Station,	46	4
Sept. 28	The sample from pump W. Pittston Pumping Station,	2	0
	Taps in district:		
Aug. 24	Wilkes-Barre City:		
	59 E. Market street,	10	0
Aug. 25	505 N. Main street,	30	0
Aug. 25	499 Carey avenue,	22	0
Sept. 28	62 Hanover street,	110	1
Sept. 28	98 Auburn street,	10	0
Sept. 28	Post Office,	14	0
Sept. 28	Public Square,	80	0
	Duryea borough:		
Sept. 28	South Main Street,	16	0

Date of collection.	Place.	Bacteria per c. c.	
		Total.	B. Coli.
	Moosic borough:		
Aug. 25	Thomas Davis,	4	0
	Pittston city:		
Aug. 25	87 Butler alley,	76	3
Sept. 28	31 Market tsreet,	8	1
	West Pittstton borough:		
Aug. 25	324 Spring street,	56	0
Sept. 28	300 Susquehanna avenue,	20	0
	Exeter borough:		
Aug 25	991 Wyoming avenue,	160	1
	Wyoming borough:		
Sept. 28	415 Wyoming avenue,	14	0
	Forty Fort borough.		
Aug. 25	1204 Wyoming avenue,	36	0
	Parsons borough:		
Sept. 28	Cor. Main and Matson streets drug store,	12	0
	Miners Mills borough:		
Sept. 28	1 Mock street,	42	0
	Minooka village (Covey reservoir supply):		
Sept 28	D. and H. station,	30	0

3. At Laurel Run Reservoir and Pine Run Dam.

The Wilkes-Barre Mountain supply and the Crystal Lake supply, because of Pine Run, were considered by the Department particularly dangerous during the prevalence of typhoid fever in Wilkes-Barre owing to the traversing by the railroads of their water shed. Hence the railroad companies were requested to close toilets on passenger coaches and this was done. The following is a copy of the letter sent to the Central Railroad of New Jersey:

"Aug. 15, 1910.

"Mr. B. B. Dorwin, Supt.,
"Central Railroad of New Jersey,
"Jersey City, N. J.

"Dear Sir:—"The prevalence of typhoid fever in the Wyoming valley to an unusual degree demands the adoption of rigid measures to stop the spread of the infection. It is, in my opinion, essential that all toilets on passenger coaches of the Central Railroad of New Jersey should be closed and kept out of commission during the transit of the trains through the water sheds of the Spring Brook Water Supply Company, with particular reference to that of Laurel Run.

"Hoping to her favorably from you by return mail, I am

"Yours truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

At the suggestion of the Department the water company installed apparatus at Laurel Run reservoir and at Pine Run dam and treated the water with a chemical germicide commonly known as hypo-chlorite of lime treatment. In the following table appears the analyses of waters from these supplies collected at different points by the Department.

4. Analyses of Wilkes-Barre Mountain Supply.

Date of collection.	Place.	Bacteria per c.c.	
		Total.	B. Coli.
	Samples from source of supply:		
Aug. 25	Gardners Creek intake,	8	0
Aug. 25	Mill Creek reservoir,	90	0
Aug. 25	Deep Hollow Canal intake at Mill Creek,	20	0
	Taps in district:		
	Wilkes-Barre:		
Aug. 24	386 E. Northampton street,	22	0
Aug. 25	160 Scott street,	12	0
Aug. 25	368 E. Northampton street,	8	0
	Laflin borough:		
Aug. 25	D. and H. stable,	26	0
Sept. 28	Inkerman village:		
Sept. 28	Residence—Martin Mulderig,	30	0
	Parsons borough:		
Aug. 25	215 N. Main street,	28	0
	Miners Mills borough:		
Aug. 25	29 Columbia avenue,	18	0

Crystal Lake Supply.

		Total.	B. Coli.
	Raw water:		
Aug. 25	Filter plant,	24	0
Aug. 25	Pine Run at reservoir,	30	0
	Filtered water:		
Aug. 25	Filter plant,	20	0
Sept. 25	Taps in district:		
	Ashley borough:		
	6 Coal street,	30	0
Sept. 28	77 S. Main street,	66	0
	Newtown village:		
Sept. 28	751 Hazel avenue,	4	0
	Wilkes-Barre city:		
Aug. 24	Cor. E. Northampton and Empire streets,	16	0
Aug. 25	203 Daisy Lane,	100	1
Sept. 28	302 McLean street,	20	0

5. Relative to the Toby Creek Supply.

Toby Creek supply was considered by the Department to be unsatisfactory both from physical evidence and later from the fact that out of nine samples collected by the Department 6 showed B. Coli present. On request the water company installed the chemical treatment at Huntsville dam and agreed to arrange for the permanent treatment of the filtrate in this manner until further orders from the Commissioner of Health. In the following table is given the analyses of this supply of samples collected by the Department at different points.

Date of collection.	Place.	Bacteria per c.c.	
		Total.	B. Coli.
	Raw water:		
Aug. 25	Intake at the filter plant,	120	1
	Filtered water:		
Aug. 25	Effluent from filter plant,	40	0
	Taps in district:		
	Luzerne borough:		
Sept. 28	361 Bennett street,	280	1
	Kingston borough:		
Aug. 25	215 Wyoming avenue,	24	0
	Larksville borough:		
Sept. 28	Kings meat-market,	120	3
	Plymouth borough:		
Sept. 28	178 Main street,	600	2
Sept. 28	249 Main street,	1,200	0
Sept. 28	Van Loon's store,	200	3
	Coal Creek supply:		
	Raw water:		
Sept. 28	Coal Creek reservoir,	300	4

6. Relative to the Harveys Creek Supply.

a. Analyses.

The Harveys Creek supply as hereinbefore stated has been continuously treated with a solution of copper sulphate. Analyses taken by the Department at Harveys Lake, at Pike Creek reservoir and at Harveys Creek intake show B. Coli present; but the samples from taps in the water district showed their absence. In the following table is the result of these tests. The water company agreed to treat Pike Crek water with a germicide.

Harveys Creek Supply.

Date of collection.	Place.	Bacteria per c.c.	
		Total.	B Coli.
	Raw water:		
	Harvey Lake:		
Sept. 23	Bathing Beach, east side,	85	0
Sept. 25	Bathing Beach, east side,	3,000	5
Sept. 23	Bathing Beach, west side,	210	0
Sept. 25	Bathing Beach, west side,	500	24
Aug. 25	Pike Creek reservoir,	250	6
Aug. 25	Harveys Creek intake,	84	2
	Taps in district:		
	Nanticoke borough:		
Aug. 25	Residence Edw. Clark, Main street,	20	0
Aug. 28	Sourceman drug store,	20	0
Aug. 28	Kearney Bros., Main street,	36	0

b. Oneonta Hotel—Water and Sewerage System—Harveys Lake.

The following letter addressed to the manager of the principal hotel at Harveys Lake explains the circumstances in connection with the water supply and sewerage works there and the possible connection of typhoid cases in Wilkes-Barre with unsanitary conditions at Harveys Lake.

"August 31st, 1910.

"P. R. Raife, Manager,
"Harveys Lake Hotel and Land Co.,
"Wilkes-Barre, Pa.

"Dear Sir:—You are requested to make certain changes and improvements to the sewerage system and water supply at the Oneonta Hotel at Harveys Lake. The drainage from the hotel, except roof and store matter should be collected in a pump well and pumped to the irrigation system on the hill established and now used for the disposal of a part of the sewage from the hotel. The kitchen drainage and laundry water should be delivered to this pump well and from it should be pumped into the irrigation fields. At the present time the kitchen drainage goes into the lake at the boat house near the highway bridge, and it produces a nuisance and is a menace to health. Laundry water is not delivered to the pump well. On Sunday Aug. 28th, this laundry water was in part flowing out into the highway gutter in front of the hotel, and apparently some of it was reaching the lake under the boathouse.

"It is reported from reliable sources that when the sewage pump breaks down and the cess-pool receives the water closet drainage, the cess-pool fills up, overflows and sewage reaches the lake. This overflow should be absolutely stopped. There should be no facilities, whatsoever, whereby kitchen drainage, laundry water, bath-tub and water closet drainage can reach the lake. All sewage should be discontinued from being discharged into the lake. To do this, changes are necessary at the hotel, and you are requested to make these changes.

"Your interests and those of public health are identical. The Lake water is not suitable to be used in a raw state at the Hotel for domestic purposes. You should install an approved filter such as it is used in a great number of hotels and resorts throughout the country. At the present time raw lake water, which has shown pollution at times by tests made by the State Department of Health, is pumped into a water tank and from thence is supplied by gravity to the hotel and is used for all general purposes, except for table use. The health of the guests of the hotel is to a greater or less degree menaced thereby. The water supplies for drinking purposes in the railway picnic grounds has been recently analyzed by the State Department of Health and found to be grossly polluted. This water comes from the lake. The Wilkes-Barre Railway Co., has been requested to discontinue the use of lake water and it is to be hoped that you will co-operate with the said railway company to see that pure water only is supplied to the public.

"The circumstances in connection with the history of a number of typhoid fever cases in Wilkes-Barre point to the infection having been contracted at Harvey's Lake. The water supply and sewerage works there should be such as to obviate any suspicion of being the means of transmitting the typhoid infection.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

c. Railway Picnic Ground Water Supply—Harveys Lake.

The bacteriological examinations of Lake Water taken from a tap in the Oneonta Hotel by the Department showed the presence of 280 bacteria and 16 B. Coli per c. c. Immediately back of the hotel and on the hillside is a public picnic ground. A sample collected from a tub beneath the water tower, from which tub the public obtain drinking water, was analyzed and found to contain 490 bacteria and 20 B. Coli.

The following letter requesting pure water to be served to the public on the picnic grounds best explains the situation here:

August 30th, 1910.

"Thomas A. Wright,
"Vice President and Gen'l Mgr.,
"Wilkes-Barre Railway Co.,
"Wilkes-Barre, Pa.

"Dear Sir:—Confirming my conversation with you over the phone last evening and carrying out the instructions of Dr. Dixon, I will state that the small tub located on the ground at the foot of the water tank adjacent to the trolley line in the picnic grounds operated by your company at Harvey's Lake, is a menace to public health. A sample of water collected from it and analyzed by the State Department of Health was found to contain large numbers of sewage organisms. Regardless of where the water comes from, the tub is not a suitable arrangement for furnishing water to the picnickers. Each person must dip the cup into the tub and any foreign matter on the cup or even in the hands is quite likely to be washed off into the tub and thus polluting matters may be accumulated.

"There is a large barrel with a faucet on the stand in the park, but it is not in use. The spring and pump over it is not in use because the spring is dry. The only water the picnickers can secure is in the said small tub. The large water tank above is filled with water pumped from the lake, the place of intake into the lake being in the immediate proximity of the outlet of the kitchen drainage and slops from the Oneonta Hotel, and also near where bathers swim. There is an overflow from the sewage receptacles at the hotel to the lake. Altogether, the lake water at this point is dangerous even as a source of supply for inferior domestic uses. It certainly is totally unfit to be supplied for drinking purposes. Nevertheless, we are reliably informed that your attendant at the Park buckets water from the large tank with which to fill the small tub above described.

"Acting at once, on Sunday afternoon, the Department's local health officer was instructed to immediately discontinue the use of the tub and have it removed, and Dr. Dixon instructs me to request you to supply pure spring water to the public in the Park and to have the barrel or apparatus in which such water is stored and from which it is drawn by the public, thoroughly sterilized and kept in a pure condition.

"Thanking you in advance for a written statement from you about the remedial measures you will take, I am,

Yours very truly,
"F. HERBERT SNOW,
"Chief Engineer."

d. At Harveys Lake in General.

There are steam boats fitted with toilets which run on schedule time around Harveys Lake. These boats are generally used by the citizens and cottagers as a common means of transportation They stop at wharfs in proximity to points from which water is taken for restaurant use and where bathing is indulged in. By order of the Department the toilets were closed on the steamboats and on the several house boats.

On the north shores of the lake not far from Alderson station of the Lehigh Valley Railroad there is an extensive picnic ground owned and operated by the railroad Here there are a steamboat landing, a boat and bathing pavillion and three stores and restaurants built out into the lake and supported on pile foundation, Water is taken by the pailful and used in these restaurants for washing. The drainage goes back to the lake and garbage also to some extent. These practices were ordered stopped. A 1.5 inch pipe extends out into the lake about 100 feet near the boat house. It is connected to the pump on the ground floor of the tank house in the picnic ground. There is another suction to the camp pump that leads to a dug well nearby. There is a hole about 28 feet deep with a tight wooden platform over it supporting a hand pump. This well water is pumped as long as it lasts into two barrels set up at different points in the picnic grounds There are faucets and drinking cups here to which the public has recourse. The lake water is pumped into the tank from which it flows by gravity to three pavilions where ice cream plates and dishes and other things are washed. Most of the picnickers bring paper plates.

When the well water becomes exhausted lake water is pumped into the barrels for drinking purposes. Large crowds come in on excursion trains to the grounds throughout the season. The superintendent was ordered not to furnish lake water for drinking purposes. He was told that the tank water should be subjected to treatment. The restaurants were ordered to cease discharging drainage into the lake and to stop polluting the waters on the shores in any manner whatsoever.

These and other precautions ordered by the Department at various properties about Harveys Lake were taken not with a view so much of conserving the purity of the waters as a source of supply to the public in the Spring Brook Water Company district as they were taken as a health measure directly bearing upon the public health of persons living at the lake or resorting thereto.

In the following table are given the results of analyses of samples of lake water collected by the Department. They all show the presence of sewage organisms.

Analyses of Harveys Lake Water.

Date of collection.	Place.	Bacteria Per O. O.	
		Total.	B. Coli.
Aug. 23	Bathing Beach,	3,000	5
"	Bathing Beach,	500	24
	Well, Lehigh Valley picnic ground,	420	1
"	Tap Oneonta Hotel,	280	16
"	Washing trough, Lehigh Valley picnic grounds,	1,000	1
"	Tank, trolley picnic grounds,	490	20

7. At Little Wilkes-Barre Mountain Supply.

Two samples of water collected by the Department at Warriors Run and Wanamie Run in the Little Wilkes-Barre mountain supply district showed the presence of animal contamination. The fences about the reesrvoirs were not intact and cattle were observed wading around the shores. The water company repaired the breaks in the enclosure. It is believed that the keeping of cows out of the enclosure will insure a reasonably pure water. The following table gives the analyses:

Little Wilkes-Barre Mountain Supply.

Date of collection.	Place.	Bacteria Per C. C.	
		Total.	B. Coli.
	Taps in district, Warrior Run borough.		
Sept. 28	Res. J. Gallagher, Chestnut Street,	60	2
	Wanamie village.		
Sept. 28	Res. William Richard,	80	2

8. Analyses of Richards Island Ground Water.

Seven samples of water were collected by the Department at different points in the district supplied by the Richards Island pumping station and the results showed them to be pure and wholesome.

The following table gives the analyses:

Richards Island Auxiliary Pumping Supply.

Date of collection.	Place.	Bacteria Per C. C.	
		Total.	B. Coli.
	Samples from source of supply.		
Aug. 25	River at Richards Island,	36	0
"	Richards Island well,	26	0
	Taps in district, Hanover township.		
"	Res. Martin McGuire, main road,	6	0
"	Res. T. R. Williams, main road,	4	0
Sept. 28	Res. Fred Willis, Hanover-Green,	2	0
"	36 Lee Park avenue,	12	0
	Ashley borough.		
"	C. R. R. of N. J. shops,*	6	0

9. General Warnings and Sanitary Survey of Watersheds.

Through the newspapers the Commissioner of Health on the 15th day of August issued a warning to the public to boil the milk and water. The following is a copy:

Warning—To the Public of Wilkes-Barre and Vicinity.

"To proprietors of hotels, restaurants and eating places, heads of families and the general public:—

"As a safeguard to your own and the Public Health, boil for twenty minutes all water to be used for drinking and culinary purposes. Also it is safer for the immediate present to boil the milk to be used on your premises."

A previous warning to boil the water has been issued by authority of the Sanitary Committee of Councils.

Every estate on the watersheds of the Spring Brook Water Supply Company was visited by a State inspector. There are 1336 such properties. The only cases of typhoid fever found were those hereinbefore mentioned, namely: on the Toby Creek supply at the Billings farm, and on the Harveys Creek watershed at Morgan Cease's, and those at Harveys Lake. Any unsanitary conditions on the 1336 properties were ordered abated and reinspections are to be made. Comparatively few nuisances were found.

Part IV.—Causes of Typhoid Fever in Wilkes-Barre and Vicinity, and Measures Taken to Suppress the Outbreak.

1. Milk Infection.

The outbreak and spread of typhoid fever in Wilkes-Barre during the summer of 1910 was at the beginning suspected of being of milk borne origin, and as the investigations progressed additional facts confirmed the suspicion and directed further investigations towards milk. The supply to each family in which a member had typhoid fever was ascertained and in the following table are given data relative to the dealers furnishing such milk and the number of typhoid fever cases among said dealers' consumers in Wilkes-Barre.

a Milk Dealers having Typhoid cases on their Routes, and Sources of Supply.

Dealer.	Typhoid cases among customers.	Source of Supply.
Alles, John, 80 E. South St.,	8	F. Ball and J. Wagner, Lagrange, Standard Dairy Company.
Altemose, Robt., 39 Willow St.,	1	Own cows (7).
Bartikowski, E. M., 220 Stanton St.,	2	Keystone Dairy, Farmers Dairy, F. Thoma, Vosburg.
Brown, Peter, 17 Worrell St.,	10	E. Thoma and N. G. Bunnell, Vosburg.
Clink, Richard, 296 E. River St.,	4	F. Ball and J. Wagner, Lagrange, Standard Dairy Company.
Callacott, J. H., 78 Blackman St.,	1	Farmers Dairy.
Collett, G. F., 242 Parish St.,	1	H. P. Bunnell, Valentine, Blackwalnut.
Collins, Thomas, 67 Carey Ave.,	1	See Rineman.
Crawley, James, 57 Hilliard St.,	1	Standard Butter Co., Owego, N. Y.
Crzebonowski, J., 54 N. Meade St.,	1	Stanley Paluch, 4 Carbon Lane.
Cut-Rate Grocery Store,	1	Waymart Creamery Co.
Dougher, John, 23 N. Welles St.,	4	Thoma, Vosburg; Place, Falls Garrison of Lagrange.
Evans, Mary, 233 S. Sermon St.,	2	Own cows (3).
Farmers Dairy (412 S. Main St., 37 N. Main St.)	13	Farms at Dorranceton and along L. V. R. R., from Lagrange to Towanda, New Era Creamery.
Goodstein, Mrs. 32 N. Hancock St.,	4	Own cows (4).
Goss, John, 59 Blackman St.,	1	Standard Dairy.
Hallaeur, Matthias, 275 McLean St.,	1	Own cows (2).
Harrison & Son, 33 Mill St.,	3	C. F. Taylor and E. Thoma, Vosburg; H. A. Allen, Mehoopany.
Harter, H. J., Hillside,	2	[illegible], McGarren and Sutton, of Trucksville; E. L. Sax, Wyoming.
Hillside Dairy, J. M. Conygham, Mgr.,	4	Own cows and S. D. Hunt, Lehman.
Jersey Queen Dairy, Riverview,	2	Own cows.
Johnson, Harry, 162 N. Washington,	1	W. H. Snyder.
Keystone Dairy, 45 N. Main St.,	10	Farms at Kunkle, Dallas, Vosburg and Franklin township. F. Thoma, Vosburg; Farmers Dairy.
Kern, Chas., 74 E. Jackson St.,	2	Own cows (60), at Alderson.
Klein, Mier, 17 Hays Lane,	1	Own cows (2).
Kresge, Chas., 46 Brown St.,	4	Wyalusing Creamery Co.
Lauser, Mrs. Lizzie, 598 Hazel St.,	1	Geo. Sheehan.
Leonard, Robt., 380 Scott St.,	9	E. Thoma, Vosburg, Standard Butter Co., Owego, N. Y.
Lews, Geo., Hanover township,	1	Own cows.
Loomis, J. B., 126 Academy St.,	1	Standard Butter Co., Owego, New York; Job and John Griffin, Milan; J. M. Williams, White's Ferry.
McGinley, Mrs., Scott St.,	2	E. Thoma, Vosburg.
McGinty, M. F., 176 Hazel St.,	2	Richard Clink.
McNellis, P. D., 469 North St.,	1	Standard Butter Co., Owego, New York.

Dealer.	Typhoid cases among customers.	Source of Supply.
Miller, Henry, 61 S. Hancock St.,	5	E. Thoma, Vosburg; M. S. Allen, Montrose.
Miller, H. F., 105 Grove St.,	1	Radle, Falls.
Mitchell & Co., 64 Hazel St.,	2	Standard Dairy Co.
Nagle, John, 148 Grove St.,	1	Farmers Dairy.
Newcomb, George, 133 Parish St.,	5	Howard Allen, Mehoopany; Brotzman, Falls; Bacon & Son, J. S. Howard and J. B. Brewer, Blackwalnut.
O'Donnell, Mrs. C., 346 Scott St.,	1	Robert Leonard.
O'Hara & Sons, 407 N. Washington,	1	McEel, Lehman.
Pearson, N. P., 489 N. River St.,	1	B. G. Manning, Mehoopany; C. P. Stroud, Blackwalnut.
Powell, W. H., 2 Lehigh St.,	2	Waymart Creamery Co.
Rau, Chas. M.,	1	Farmers Dairy.
Regan, S. J., 265 S. Welles St.,	1	Keystone Dairy.
Rineman Bros., Trucksville,	32	Own cows (sold out to Collins).
Schimpff, Mrs. Barbara, 213 N. Washington St.	3	Keystone Dairy; Farmers Dairy, E. Thoma, Vosburg.
Schmoll, G. F., Forty Fort,	3	Own cows (23), Wm. Prime, Forty Fort.
Schneider, Jos., 523 N. Penna. Ave.,	2	Standard Butter Co., Owego, New York; E. Thoma, Vosburg.
Sheehan, Geo., 61 Sandborn St.,	10	Stadard Butter Co., Owego, New York; E. Thoma, Vosburg.
Snook, Chas., Hanover township,	1	Own cows.
Snyder, W. H., 80 S. Hancock St.,	2	M. S. Allen, Montrose; J. B. Davies, Scottville.
Standard Dairy Co , 181 N. Penna. Ave.,	6	22 farms in vicinity of Dallas, Laceyville, Centre, Moreland and Mehoopany
Stoltz, Mrs. S. A., 63 Jones St.,	3	Farmers Dairy.
VonBusch & Son, 408 S. Main St.,	2	E. Thoma, Vosburg.
Wallace, W. A., So. Main St.,	2	Own cow (1).
Waters, Mrs. Hugh, 138 Spring St.,	1	Own cow (1).
Williams, R. G., 508 Carey Ave.,	1	E. Thoma, Vosburg; E. Love and J D. Dexter, Blackwalnut.
Winterstein,	1	Fred Ellsworth and Ira Kresge, Miners Mills.
Young, A. L., 57 Hazel St.,	2	J. B. Loomis.

The underscored names of sources of supply also appear in the above table in the column of the dealers.

The total number of cases of typhoid fever in the table will be greater than the actual number of cases occurring since certain patients used milk from two or more dealers.

b. Rineman Bros. Milk.

The outbreak first appeared among families using the Rineman Bros. milk, that is to say, these cases first received the attention of the State. Dr. Charles H. Miner of Wilkes-Barre, Medical Inspector of the State Department of Health for Luzerne County, had brought to his attention on August 1st, the fact that there were several cases of typhoid fever at a farm house near Trucksville, Kingston Township occupied by a family named Billings. He visited the premises the same day and found the following situation. Mr. Billings, his wife, two daughters, and a son comprise the family. The father and son were bed ridden with typhoid fever. A married daughter, Mrs. Addison Woolbert, 22 years of age, residing at Trucksville, was also a victim of the disease at her home. She had visited back and forth and had remained with her parents for some time before the onset. Cecilia Haddock, 18 years of age, who had made frequent visits at the Billings farm, was also a victim and confined at her home, 132 Park Ave., Wilkes-Barre; also her brother, Samuel, 16 years old, who up to the time of the onset of his case, had been a summer boarder at the Billings farm. The dates of onset of these 5 cases appear in the following table:

Patient.	Age.	Onset.
Cecilia Haddock,	18 years,	July 1st.
Walter Billings,	27 years,	July 12th.
Mrs. Addison Woolbert,	22 years,	July 20th.
Frank Billings,	50 years,	July 24th.
Samuel Haddock,	10 years,	July 24th.

Dr. Miner gave the customary instructions to the trained nurse in charge relative to the disposition of household wastes and the water supply.

The Billings house is provided with a bath room, water closet and set wash bowls, connected with a vitrified pipe sewer 4 inches in diameter, laid 3 feet deep and extending from the rear of the house about 80 feet to a loose earth percolating vault, over which there is a privy. Water for operating the bath tub and water closet is pumped from a spring well by a gas engine into a tank in the attic. During the winter last past the premises were unoccupied. Mr. Billings took up his residence there on April 1st, of the current season. The gas engine pump, and water closet have not been used since the outbreak of typhoid fever on the premises. All water is now pumped by hand from the spring well, but there is a cup at this well and members of the household go there frequently to quench their thirst.

The spring is about 20 feet distant from the rear of the house and 8 feet lower. It is enclosed by a masonry building used as a spring house. This building is of commodious size. It has stone walls 6 feet high supporting a wooden roof. The floor is of cement concrete, and in the centre is a depression or channel 10 inches deep into and out of which the waters of the spring flow to the run which begins outside of the spring house under the door sill. On the floor and in the trough milk and food stuffs are kept in cold storage. The run descends about 100 vertical feet in the distance of 2000 feet to the West Branch of Toby's Creek at a point several thousand feet above the intake of the Spring Brook Water Supply Company at the filter house. As soon as the presence of the disease was known to the water company, (July 25th), a copper sulphate solution was introduced into the spring run near the spring house as a special precaution to prevent contamination of the public water supply, although the water in the stream sank into the ground and disappeared and there was no flow to be observed half way down the hillside. This was continued until the patients had fully recovered.

The spring itself is at the foot of a bank in the far end of the spring house and it presents the appearance of a cave. It is enclosed in a wall of stone masonry about 5 feet square in plan and 2 and one-half feet deep, there being 18 inches of water in it. Walls are carried up on both sides and they support the arch whose crown is 6 feet above the water. These walls retain the earth in the bank out of which the water gushes. Access is had to the spring well only in the spring house. The water level is several inches higher than that in the trough which receives the overflow. Samples of water collected on August 5th from the well showing the water to be pure; but samples of water collected from the end of a pipe line fed by the spring well water and from the trough into which the pipe discharged, on the neighboring farm of Rineman Brothers, at the milk shed, showed the presence of sewage organisms.

Rineman Bros. farm adjoins the Billings farm on the hillside below. Both properties are in Jackson Twp. distant about 4 miles from Wilkes-Barre. The Rineman Bros. up to the first part of September conducted a dairy and operated a milk route in the city. At that time they had about 23 cows and produced in the neighborhood of 200 quarts of milk daily which was delivered to about 90 customers.

A ¾ inch iron pipe conveyed water by gravity from the Billings spring well to the Rineman's milk shed, distant about 800 feet. There is a trough in this shed in which cans filled with milk were set to be kept cool.

In some unknown way the Billings spring became infected and this infection was transmitted to the said milk shed. The typhoid outbreak along the milk route in the city subsequently followed. There were ample opportunities for pollution of the spring water. The sewer line passed within 20 feet of the spring and five feet higher. The pipe was unearthed at one point and found to have a broken joint. The earth round about was saturated with sewage. This was a permanent menace to the spring. Dipping of household utensils and the drinking cup into the well while the patients were coming down with the disease, or thereafter, was done and this menaced the purity of the waters. The flow from the spring is quite considerable, hence a casual contamination would not remain, accounting for the fact that when tested no pollution was found. It is easy to understand the manner in which the milk hight have been infected at the milk shed.

Dr. Miner gave orders on the first day of August for the immediate discontinuance of the use of the milk shed. He ordered a thorough disinfection of all milk cans, bottles and utensils.

During the current year, no sickness of any kind has occurred in the Rineman household. But in the fall of 1907 the oldest brother was a victim of typhoid and following this case there was an outbreak of the fever among the customers along the route. Again during the summer of 1908, following a case of typhoid fever at the Billings farm, then occupied by Chas. Haddock, there were about a score of typhoid victims along the said route in the city. The State Health authorities attributed this outbreak to milk infection and the city authorities stopped the sale of Rineman milk for a while. The occurrence of 32 cases of typhoid fever among users of this milk during July and August of 1910, is also attributed to infection of the milk.

On August 12th, of the current season, when the Chief Engineer of the Department accompanied by the County Medical Inspector and Chairman of the Sanitary Committee of Councils, inspected the Rineman property, the milk pails and utensils, cans and milk bottles, had not been sterilized. They had been washed out in hot water only. The import of the health regulations of the city, respecting the interchange of milk bottles or vessels at houses where typhoid fever cases existed, was not thoroughly appreciated. The Rineman Brothers seemed to be willing to be instructed about what to do, and explicit orders were given and they were carried out with good intentions. In spite of this, samples of milk collected on August 26th, and even as late as September 2nd, showed pollution. Finally, an officer of the Department, in company with the City Bacteriologist, went to the farm and personally conducted a thorough disinfection of the bar and cattle and all dairy utensils. A disinfecting solution was used on the stock and the dairymen were enjoined to wash the cow's flanks, tails and the udders in the solution, and to wash their hands in it before milking the cows. Only after this clean up did examinations of the milk by the City Bacteriologist show the milk to be free from B. Coli.

The spring on the Rineman farm, which is the supply for domestic purposes, is located at the house a few feet from the kitchen porch. Laundry and other washing operations are performed on the porch and the water is either thrown upon the ground or emptied into the kitchen sink. An old blind drain, merely a ditch filled with stone and covered over with sod, extends from the sink along and but a few feet distant from the side of the spring house and at a higher elevation, to a cesspool down the hillside 15 rods from the kitchen.

The overflow from the spring, which is walled up but not covered, feeds the spring and cooling house adjoining, where milk, vegetables and food stuffs are kept.

The following communication was sent by the Department to Rineman Bros., on August 13, 1910:

"Gentlemen:—In the endeavor of the City and State Health officers to clean up the typhoid fever situation in Wilkes-Barre and vicinity, it is necessary to know, not only about the public water supply, but about the milk supply. The best way to remove all suspicion of individual milk supplies, and to restore to public confidence all milk-dealers and milkmen, is for the latter to cooperate with the constituted health authorities and to do the things requested by said authorities.

"Afer certain things shall have been done, your milk should be purchased with confidence by your customers. Changes will be suggested at the Billings farm whereby the water from the spring there may safely be supplied to your barn. The sewer should be taken up and be replaced by a cast iron pipe, leading to a cesspool to be built down the hillside at a safe distance. The surface drainage should be diverted away from the spring and spring house. The old vaults should be dug out, disinfected and filled with new earth.

"At your farm a concrete floor should be laid in the cooling house at the barn. The water should be diverted into a concrete trough raised above the floor and this trough should be separated from the trough, outside the building, used by the cattle. The latter trough should be 12 inches below the cooling trough inside the building. All the waste water from the latter should overflow into the trough outside.

"The old blind drain leading from your kitchen should be dug up and the earth should be disinfected and buried and a new cast iron pipe should be laid from the kitchen to a new cesspool to be built down the hillside at a safe distance, say 300 feet away. Then the enclousre about the spring house should be improved to make impossible roof or surface water reaching the spring or steps leading down into it. The floor of the spring house should be kept dry, and a concrete wall 12 inches or more high should be built around the four sides of the basin holding the water. In this way no dirt or polluting material can be transmitted by boot or shoe to the floor of the spring house and subsequently contaminate the water.

"Immediate attention to those details, to the satisfaction of the city and State authorities, should place your propery in as fair a condition as that of any first class farm situated as your property is situated.

"We need to have a list of your customers, their names, street numbers and daily consumption by families. You will by supplying this information, be helping your own case and it will facilitate our work as health officers."

The cases of typhoid fever occurring during the present summer in Wilkes-Barre, attributed to polluted Rineman milk, or to infected milk retainers handled by the Rineman Bros., and reported information relative thereto, showing the name, age, address, occupation, date of onset and number in family, are given in the following table:

No.	Typhoid Patient.	Age—Years.	Address—Wilkes-Barre.	Occupation.	Date of Onset.	No. in family.
1	Geo. Kreidler,	7	188 Park Ave.,	At home,	July 4,	8
2	Mrs. P. F. Andes,	52	29 Abbott,	At home,	July 4,	5
3	Nellie Dean,	34	260 N. Main,	Clerk,	July 10,	6
4	Louis Rinker,	39	27 Walnut,	Mail Carrier,	July 14,	4
5	Fred Vincent,	39	285 S. Wash.,	Attorney,	July 14,	4
6	Mrs. W. A. Mellick,	35	231 N. Main,	At home,	July 15,	2
7	Mary Dunn,	25	256 Academy,	At home,	July 20,	4
8	Edith Price,	42	229 N. Main,	Employment Agency,	July 23,	3
9	Philip Umbewust,	48	72 Hazel,	Saloon Keeper,	July 24,	3
10	Isabelle Wideman,	14	70 Hazel,	At home,	July 25,	5
11	Ethel Bartleson,	13	24 E. Ross,	At home,	July 25,	6
12	Clarence Bartleson,	21	24 E. Ross,	Jeweler,	July 25,	6
13	Catherine Kreidler,	14	188 Park Ave.,	At home,	July 25,	8
14	Gretchen Allen,	11	235 N. Main,	At home,	July 29,	3
15	Alfred Bossert,	13	67 N. Main,	At home,	July 29,	4
16	Joseph Ashberger,	21	67 N. Main,	Bartender,	July 30,	9
17	Mrs. Francis Schrage,	42	15 Mallery,	At home,	July 31,	5
18	Michael Umbewust,	42	72 Hazel,	Fire Dept.,	July 31,	3
19	Harry H. Garrison,	43	222 Park Ave.,	Jeweler,	Aug. 1,	3
20	Henry Rabotski,	18	40 O'Neil Ave.,	At home,	Aug. 1,	8
21	Mrs. John Shumacker,	53	34 Wright,	At home,	Aug. 7,	3
22	Elizabeth Wideman,	18	70 Hazel,	At home,	Aug. 11,	5
23	Mrs. W. H. Peters,	31	37 Hickory,	At home,	Aug. 12,	5
24	Elizabeth Pierce,	14	51 Wright,	At home,	Aug. 19,	4
25	Honora McCormick,	22	72 S. River,	Domestic,	Aug. 20,	7
26	Arthur Rhoads,	29	27 Catharine,	Trav. Salesman,	Aug. 20,	2
27	Ethilda Zimmer,	35	23 Orchard,	At home,	Aug. 20,	3
28	Bryan McManaman,	67	90 S. Main,	Laborer,	Aug. 21,	2
29	Jennie Weiss,	31	67 S. Main,	Domestic,	Aug. 24,	13
30	Leander Haddock,	19	132 Park Ave.,	At home,	Aug. 24,	10
31	Lewis Schrage,	44	15 Mallery,	Merchant,	Aug. 24,	5
32	Bertha Bombe,	16	72 S. River,	Domestic,	Aug. 28,	7

The Bertha Bombe case may have been secondary. She was employed at the Sterling residence at Wilkes-Barre. She went to her home in Nanticoke on August 16th, for a rest and was taken with typhoid fever 12 days later. In the meantime the Sterling laundress Honora McCormick was stricken. The Catharine Kreidler case may have been originated from the case of her brother, George, in the household. Elizabeth Wideman may have contracted the disease from her sister Isabella. The wife of Lewis Schrage was a victim, from whom he may have caught infection. Two trained nurses and several medical speciallists were in attendance on the two prior cases at the Haddock residence. Extreme precautions were taken to prevent contagion. However, milk from the Rineman farm was brought into the home during all this time. This milk was also delivered to the Kreidler family and to the Wideman households after the typhoid outbreak there. The same milk was supplied to Lewis Schrage for over a week after he was stricken. Careful inquiry into the habits and movements of these victims failed to reveal any other probable origin than that of primary milk infection, or of secondary infection, excepting the cases of Catharine Kreidler. She partook of ice cream freely at various places about the city. However, the persistence of the disease among the Rineman Bros.' consumers is considered significant, more especially since the fever prevailed in 25 families or 28 per cent. of the customers known to use Rineman Milk. These figures are approximate only, and are based on reports of our inspectors and the list of customers handed in by the said milk men.

The history of each case was carefully investigated by the Department.

In the George Kreidler and Mrs. P. F. Andes cases, there is no suspicion of any other than milk infection.

Nellie Dean, clerk in Lazarus' grocery store, drank freely of Rineman milk and sold it to others. There is no other suspected origin. This is also true of the Louis Rinker, Fred Vincent, Mr. W. A. Mellick and Mary Dunn and Edith Price cases.

Gretchen Allen bought Rineman milk at Lazarus' store and drank it on the premises.

Alfred Bossert and his father's bar-tender, Jos. Ashberger drank freely of Rineman milk on the premises. But Joseph slept at his home on Mayer street, where there are 9 in the family. He was the only one to contract the disease. The other members of that family used milk from a different source.

Henry Rabotski and Alfred Bossert are cousins; they were inseparable companions and frequently slept together up to the time of Alfred's onset. This may have been a case of infection by contact. However, Florence Rabotski, whose name does not appear in the above table, was the first known case of typhoid fever among the Rineman customers this year. Her onset was reported June first, and she was not confined more than two weeks, the fever having a very light run. The family were supplied with Rineman milk during the illness of Florence, and up to August first when Henry was taken ill. It is quite possible that Florence Rabotski may have been the original case, and that through the medium of the milk-men and certain utensils, the infection was carried from the household to the Rineman farm, and from thence, through lack of sterilization of the dairy utensils, the infection may have been distributed. The Billings kept two cows belonging to Chas. Haddock, and the milk was daily brought into the city in a separate can by the Rineman Bros., and delivered to the Haddock residence, so it is reported. There is known to have been negligence on the part of the family and milkman in the observance of precautions thought all essential to prevent the spread of infection. In consequence, possibly, Cecilia Haddock contracted the disease with the results as described.

Philip Umbewuse is proprietor of a hotel and his brother Michael, driver for the City Fire Department, takes his meals at the hotel. Rineman Bros. supplied the place with milk. The Bartlesons are nephew and niece respectively of the Umbewust Brothers. By reference to the table it will be noted that 3 of the 4 came down on July 24th or 25th, and Michael's onset occurred a week later. The one common source of possible infection was the Rineman milk. However, at times Young's milk and milk from Mitchell's bakery nearby was used at the hotel.

Harry H. Garrison, Mrs. W. H. Peters. Ethilda Zimmer and Bryan McManaman cases have no circumstances which point to other than milk as the origin of the infection, although in this instance of the last named, the information as to his habits is meagre and perhaps unreliable.

Jennie Weiss was a chamber-maid at the Simpson Hotel. She drank Rineman's milk frequently, was a hard worker and seldom went out. When taken sick she returned to her home at Nescopeck.

Elizabeth Pierce drank Rineman Bros. milk and occasionally Clink milk. Furthermore, she was fond of ice-cream and ate it often when in town. Arthur Rhoads is a traveling salesman, recently married, his wife is a graduate nurse and careful house-keeper. Boiled public water is used at home and extreme care is exercised in drinking only bottled waters while traveling throughout the Wyoming Valley, which is the scene of his labors.

These last two described cases are attributed to Rineman milk infection because there is no reason to suspect other causes when said milk was known in all probability to be infected.

It will be noted that August 28th, is the date of the last onset of a case of typhoid fever attributed to Rineman Bros. milk. Allowing for an incubation period of from 10 to 14 days from the time typhoid fever entered the human body, to the time the disease had developed in that body sufficiently to be diagnosed as typhoid fever, and we have between August 14th and 18th beyond which Rineman milk was free from pathogenic pollution. The State officers instituted radical changes at the Rineman farm or ordered them to be instituted on August 12th, and followed these orders up with visits by inspectors. Furthermore the orders of the Commissioner of Health to the public and milk dealers with respect to the non-interchange of milk containers in the town at dwellings where a case of typhoid fever existed, and the activities of the officers in watching along the milk routes in the city to detect violation of these orders, all had a very pronounced effect in the adoption of the remedial measures at the Rineman farm and along their route and this shut off the typhoid poison from being transmitted through the medium of milk or dairy utensils, but, as will appear in the following table of bacteriological analyses, the milk was not free from other polluting matter until a much later time.

Date of Collection	Sample.	Bacteria per c. c.	
		Total.	B. Coli.
	Rineman Water:		
Aug. 5	Billings spring,	182	0
Aug. 5	Rineman milk shed trough,	3,360	13
Aug. 5	End pipe at milk shed,	42	1
Aug. 25	Billings spring,	50	0
Aug. 25	Rineman spring,	160	0
	Rineman Milk:		
Aug. 25	Can in spring house,	900,000	84,000
Sept. 1	Can No. 1 spring house,	120,000	10,500
Sept. 1	Can No. 2 spring house,	1,500,000	0
Sept. 1	Can No. 3 spring house, (Haddock milk)	10,000	0

c. Thoma Milk. (Vosburg Creamery.)

A particular investigation of the source of milk supply to the families in Wilkes-Barre in which typhoid fever had developed, revealed the fact that over three score of such cases were furnished with milk shipped from the Vosburg Creamery, Wyoming County. Mr. Edward Thoma, the proprietor and operator was supplying directly or indirectly 19 dealers in Wilkes-Barre. Data relative to the milk and typhoid cases among the customers of these dealers are given in the following table:

Name of Dealer.	Address.	Quantity Supplied Daily.		No. of typhoid cases among customers.
		By Thoma.	By other shippers.	
Geo. H. Sheehan,	61 Sanborne St.,	4 cans,	Standard Butter Co., 4 cans.	10
Robert Leonard,	380 Scott St.,	3 cans,	Standard Butter Co.,	9
Peter Brown,	17 Worrall St.,	2 cans.	Nelson G. Bonnel, 3 cans.	10
Henry Miller,	61 S. Hancock St.,	2.5 cans,	M. S. Allen, Montrose,	5
William Cimber,	507 N. Main St.,	1 can.		0
Rubyn Williams,	508 Carey St.,	1 can,	T. D. Dexter, Blackwalnut.	
			Ernest Love.	1
Jos. Schneider,	523 N. Penna. Ave.,	2 cans,	Standard Butter Co., 2 cans.	2
Keystone Dairy,	45 N. Main St.,	3 cans,	Farmers in Dallas, Vosburg and Franklin Twp. Farmers Dairy.	10
John T. Dougher,	23 N. Welles St.,	1 can.	Place, Falls., Pa., Garrison of Lagrange.	4
Harrison & Son,	33 Mill St.,	2 cans,	C. F. Taylor, Vosburg, H. A. Allen, Mehoopany	8
W. A. King & Co. (Bakery)	147 S. Wash St.,	2 cans,		0
Jones Bros. (Bakery),	279 E. Market St.,	1 can,		0
W. VonBusch & Son, (Grocery)	408 S. Main St.,	3 cans,		2
E. M. Bartikowski,	220 Stanton,		Keystone and Farmers Dairy,	[illegible]
Mrs. McGinley,	Scott St.,			2
Mrs. Schimpff,	213 N. Wash St.,		Keystone and Farmers Dairy	3
				63

Indirect.

Mrs. Lizzie Lauser,	508 Hazel St.,	Supplied through Geo H. Sheehan.	1
Mrs. C. O'Donnell,	346 Scott St.,	Robert Leonard,	1
S. J Regan,	265 S. Welles St.,	Keystone Dairy,	1
			3
Total number of cases supplied with Thoma milk,			66
Duplicates explained hereinafter,			6
Correct total,			60

The Vosburg creamery milk, thus being put under suspicion as a possible source of typhoid, was made the subject of an immediate investigation. This creamery is located in the village of Vosburg, Washington Township, Wyoming County, on the line of the Lehigh Valley Railroad, 36 miles from Wilkes-Barre, and along the North Branch of the Susquehanna River. The property belongs to the Railroad Company but is leased by Edwin Thoma.

The building is of frame construction and is adjacent to the railroad, 10 feet from the passenger station. It is 30 feet wide and 90 feet long, 2 stories high without a basement. At one end there is a receiving and shipping room. In the middle are the churn and cooling rooms, and at the other end is the ice house which occupies about one-half of the entire building. Ice is taken from the river nearby, 5 miles above Tunkhannock. None of the ice comes in contact with the milk.

The water supply of the creamery is a well about 10 feet in diameter and 15 feet deep, walled up and housed over and located on the hill-side beyond the railroad tracks opposite the creamery at an elevation of about 100 feet. The hill is steep and wholly wooded. A two inch pipe conducts the water by gravity into the creamery. There is running water in the building most of the time. The well in September was nearly dry and last year in September was entirely empty. At such times water for the creamery uses is taken from the Vosburg Creek nearby. The same water is supplied to an ice cooler in the station for drinking purposes. There is no storage of water anywhere, except in the well.

The farmers always bring the milk in the morning in cans belonging to them, and these cans are taken into the receiving room where the milk is measured with a metal rod hung on the wall where flies can get at it. There are no screens in the windows or doors, but flies are not numerous.

The milk is then strained from the farmer's can into a sterilized can owned by Thoma. The strainer is a double affair consisting of a brass 100 mesh sieve permanently attached to a tin funnel of size to be adjusted over the mouth of the 10 gallon cans. The brass strainer is fitted into another cylinder in which is placed cloth. The milk is therefore said to be doubly strained, first through the brass sieve and then the cloth. Each cloth is used but once and they are thoroughly cleansed at the Thoma residence nearby. About 20 such cloths are kept in readiness for use but there is only one brass strainer.

The farmer does not wait for his can to be cleaned. He owns two sets and he is required to leave the can brought that day and to carry away his can of yesterday. In the meantime this can has been thoroughly cleansed and sterilized with steam at the creamery. Personal attention is given by Mr. Thoma to this operation. The filled milk can is then placed in the cooling tanks in the adjoining room and kept there for shipment. Thus one man's milk goes directly to the consumer, except there be less than 40 quarts in the mess when the can will be filled up with the product of some other farmer.

The milk train stopping at Vosburg on the way to Wilkes-Barre is at 2.30 in the afternoon, and it is the only one. No passengers are carried. Mr. Thoma ships all of his milk on this train in a regular refrigerator milk car. This train has about 20 milk cars on it and milk is distributed at points farther east, probably as far as New York city. On the return the cans are brought in at about noon by the same class of milk train.

There is a separator in the receiving room and when the product of milk is sufficient, cream is made. Owing to a shortage of supply this separator had not been used since June.

In the boiler house there is a 10 horse power boiler and engine, and steam is piped into the receiving room to tanks where the milk cans are cleaned and sterilized. These are wooden tanks furnished with running water, there being a faucet over them. The cans are first washed with hot water and a soap powder called "Wyandotte Cleaner," made expressly for dairy purposes. The can is then thoroughly rinsed in cold water and then placed in the open vat over a live steam jet. His own cans after this cleansing are put in horizontal racks with the mouth uncovered. The covers are washed in hot water and stacked up in a place for them. They are also sterilized in the steam vat. The cans belonging to the farmers which are cleansed are sterilized have their covers put on and then are placed on the sheltered platform outside and kept there.

In the cooling room there are two cement concrete vats about 7 feet wide and 10 feet long with a passage-way between. The water and ice fills these vats to a depth sufficient to cover the milk cans to within four inches of the top. There is room for 42 cans in each vat. One vat only was being used at the time of the Department's inspection. The water is changed two or three times a week, depending upon the weather.

The scrubbing brushes and stirring utensils are thoroughly cleansed and sterilized daily. Mr. Thoma does not employ any help, but does everything himself. The tubs, tanks, etc., have plugs in the bottom which are removed and water flows out on the floor to a sump in the middle of the receiving room which has a pipe connection leading to a cesspool in the yard which is not apparent, but it overflows to the run nearby, so it is reported. The floor is in poor condition.

The producers of the milk supplied to the Vosburg Creamery comprises 23 farmers all of whom live in Washington Township. Their names and the quantity of milk supplied daily, as reported, are given in the following table. Each can holds 40 quarts.

Name.	No. of cans supplied daily.
C. E. Treible,	Two.
O. M. Treible,	Four.
J. R. Place,	One and one-half.
S. I. Treible,	One.
Otto Smith,	One.
Emery Remington,	One.
W. P. Jayne,	One and one-half.
Chas. Culver,	One.
James O. Rowe,	One and one-half.
A. H. Russell,	One and one-half.
John T. Gardner,	One.
Edward L. Place,	Two.
John S. Walters,	One-half.
L. G. Hobbs,	One-half.
Chas. R. Farr,	One-half.
George A. Carney,	One-half.
Arthur Remington,	One.
J. E. Laurent,	Two.
John W. Leipham,	One.
George Davies,	One and one-half.
D. W. Kintner,	One.
G. R. Furman,	One.
C. L. Depew,	One.

Tphoid fever was discovered at the farm of Emery Remington of John R. Place and later it developed on the S. I. Trieble farm. The nearest neighbor to Emery Remington, a family by the name of Henry, suffered from the infection. There were three cases here attributed to polluted Remington milk.

In the following table is given the name of patients in order of date of onset:

1910

Typhoid Fever Cases, Washington Township, on Farms, Producing Milk for Vosburg Creamery.

Onset	Patient.	Age.	Remarks.
Aug. 1,	Stanley Remington,	24	Case imported.
Aug. 6,	John R. Place,	50	Origin unknown.
Aug. 13,	S. I. Treible,	39	Neighbor of place.
Aug. 14,	Margaret Henry,	17	Remington farm tenant.
Aug. 17,	Alvin Henry,	7	Remington farm tenant.
Aug. 20,	Hanna Henry,	15	Remington farm tenant.

Stanley Remington was employed at the Coxtown yards of the Lehigh Valley Railroad up to July 30. He lived at 26 Prospect street, Pittston, in a family named Lewis, and roomed with Raymond Lewis, aged 20, who was taken ill with typhoid fever July 20th. Stanley Remington, aged 24, visited his father's house near Vosburg, July 4th. On July 25th, he complained of feeling ill but continued to work at the yards until July 30, when he quit and started on a trip to Niagara Falls. He was taken sick on the train and reached his father's house in the afternoon of August 1st. A doctor was called in and treated the patient for typhoid fever. The case was not reported nor the premises placarded until August 16th. Dr. Miner, for the Department stopped the sale of milk from the Remington farm on August 17th.

During the first part of Stanley Remington's illness the discharges were thrown on the ground near the privy 15 feet from the house. Later they were disinfected and buried. Milk pails were kept in the open air at the cellar bulk-head, a few feet only from the privy. Fly infection was possible.

The Remington family besides Mr. Remington and his wife, consisted of two sons living at home, Philip, 21 years and George 19 years old. The son Arthur, 26 years of age, lives at Vosburg. George cared for the cows and the milk.

The Lewis family at Pittston was supplied with berries and vegetables by Mrs. John Coolbaugh of Exeter Township, Wyoming County. Her husband had succumbed to typhoid fever the week of July 4th. A farm hand had had a light attack one month earlier.

On the Remington farm was the tenant family of George Henry, consisting of Mr. and Mrs. Henry, Mr. and Mrs. Justin Loomis and three daughters and two sons. Mr. Henry did not keep cattle. The family purchased two quarts of milk daily from Remington. Mrs. Henry did washing at Remingtons and she also worked at Treibles before her children were taken ill, but not since.

S. I. Treible resides on the adjoining estate to the Place farm. The houses were a few hundred feet apart only. Mr. Treible took care of his own cows and those of Place. There was no water supply on the Treible farm; but on the Place farm there is a copious spring walled up, covered over and apparently protected against surface pollution from the adjoining highway.

The spring house is a few feet only from the spring. It is of stone construction and water from the spring is led by an inch pipe to a sump in the concrete floor. On the opposite side of the public highway are the farm buildings and privy, all less than 200 feet distant and elevated between 20 and 30 feet higher. The spring is used by the public. Summer campers nearby had constant recourse to it for drinking water. Mr. Treible used this spring exclusively and he cooled all his milk in the spring house.

The Department stopped the sale of milk from Treible's farm. Mr. Place's cows were taken to the Otis Treible farm.

In the following table are given analyses of milk and water at the Vosburg creamery and at the places where typhoid fever occurred:

Milk and Water Analyses—Vosburg Creamery and at Producers Farms Where Typhoid Fever Occurred. Washington Township, Wyoming County, 1910.

Date of collection.	Locality.	Bacteria per c. c.			
		Water.		Milk.	
		Total.	B. Coli.	Total.	B. Coli.
Sept. 13	Vosburg creamery,	----------	----------	----------	----------
Sept. 13	Vosburg creamery, ice supply,	24	1	216,000	----------
Sept. 13	Vosburg creamery, spring water,	56	1	----------	----------
Sept. 13	Vosburg creamery, cooling vat,	7,000	0	----------	----------
Aug. 23	John R. Place, spring,	1,500	13	----------	----------
Aug. 23	John R. Place, spring house,	190,000	2,600	----------	----------
Sept. 13	John R. Place, spring,	1,000,000	0	38,000	11,200
Aug. 23	E. Remington, well,	350	2	----------	----------
Sept. 13	E. Remington, well,	108,000	0	40	0
Aug. 23	Mr. Henry, well,	750	40	----------	----------
Sept. 13	S. I. Treible, spring not used,	100	13	----------	----------
Sept. 13	Jas. Rowe, well no typhoid,	400	13	----------	----------

Sanitary inspections were made at all of the farms producing milk supplied to the Vosburg Creamery. Numerous corrections in methods of household waste disposal, protection of water supplies, conditions at spring houses and in the barns and yards and in the method of cleaning milk utensils and handling the milk generally were brought about by the Department's officers.

Spring and wells were disinfected where necessary. The farmers were generally glad to be instructed and apparently faithfully followed the rules laid down. Mr. Emory Remington, however, was obstinate and sought the advice of an attorney, with a view of prosecuting the newly appointed Medical Inspector of Wyoming County, Dr. H. I. McKown of Tunkhannock, because of the stopping of the sale of his milk. Mr. Remington was convinced finally of the necessity of the course dictated by the Department.

At the Vosburg creamery, Mr. Thoma cheerfully instituted a few slight changes suggested by the inspectors.

In fairness it will not do to charge to the Thoma milk all of the 63 cases. Other possible causes may have contributed. Some of these cases have no other suspected cause. Some are attributed to Rineman's milk and still others to secondary infection or spring water or Harvey Lake or to the bathing in or boating on the river below sewer outlets. Some of the cases are duplicates. Before making a statistical statement, the student of this epidemic will want to know some facts about each dealer who distributed Thoma milk.

GEORGE H. SHEEHAN, DEALER. George H. Sheehan of 61 Sanbourne street receives from Thoma, 160 qts. daily, and from the Standard Butter Company of Owego, Tioga County, N. Y., 180 qts. daily. The New York State authorities investigated the sources of supply of the Standard Butter Company and found the rumor that typhoid fever was existing at one or more of the farms producing the milk to be unfounded.

Mr. Sheehan is a dealer in milk, butter and eggs and country products. He vends the supplies and has 196 milk customers.

In the families of six customers only did typhoid fever occur. Data as to these cases are given in the following table:

Typhoid Fever Cases on Sheehan Route.
Total Customers 196.

Date of onset	Patient	Address	Age.	No. in family	Employment.
July 20	Byron Flynn,	563 Hazle St.,	7	7	At home.
July 20	Mary Flynn,	Hazle St.,	9		At home.
July 23	Thomas Flynn,	Hazle St.,	5		At home.
July 25	Joseph Flynn,	Hazle St.,	3		At home.
July 27	Robert Gilligan,	613 Hazle St.,	5	6	At home.
Aug. 1	Margaret Gilligan	Hazle St.,	8		At home.
July 30	Mary Gilligan,	249 Blackman St.,	37	4	Saleswoman
Aug. 10	Elizabeth Ferry,	105 Jones St.,	7	7	At home.
Aug. 6	R. J Souden,	144 Blackman	31	5	Vulcan iron.
July 25	Florence Davis,	212 McLean,	6	4	At home.

The four cases in the Flinn family appear to have been from a single infection. Neighbor Renner's boy, five years old went down with typhoid on July 15th. The Flinn children played in Renner's yard. Robt. and Margaret Gilligan did not play with Renner boy and the Flinn children. Michael Carrigan keeps a candy shop in the front part of the Gilligan residence and sells milk and ice cream. Sheehan supplies the milk. Mary Gilligan is not related to the Hazel Street family of that name. She was employed in Clark's Dry Goods store. She has not been away from home or attended any parks or resorts and was unacquainted with any typhoid patient except Souden whom she knew to recognize only. Elizabeth Ferry was the only one in the family who had typhoid. The premises were clean, she had attended no resorts and the family had had no callers known to be connected in any way with typhoid. Thoma milk was delivered at premises by Bartikowski and by Sheehan. The family also used Stoltz milk from Farmers Dairy and Kresge milk from Wyalusing Creamery.

Robt. Souden was confined to his bed one week only. He is a blacksmith employed at the Vulcan Iron Works. There were no typhoid patients among his associates and no circumstances pointing to any origin of infection save, possibly, the milk. His case was examined by Dr. Miner and pronounced to be the ambulatory form. Florence Davis was at Harveys Lake picnic July 24th. Mr. Davis had brought home for drinking purposes water from the Vulcan Spring. The family used Hauks well water.

ROBERT LEONARD, DEALER. Robert Leonard keeps a store and conducts a milk route from 380 Scott Street. He receives his supply from Thoma and the Standard Butter Company of Oswego and supplies daily 142 customers. In seven families only did typhoid fever appear among his customers. Data concerning these cases are given in the following table:

Typhoid Fever Cases on Leonard Route.

Total Customers 142.

Date of onset.	Patient.	Address.	Age.	No. in family.	Employment.
June 4	Thomas Donlan,	63 Baltimore Lane,	17	8	Mine driver.
July 30	Wm. Donlan,	63 Baltimore Lane,	13		At home.
July 4	Mrs. Peter F. Andes,	29 Abbott St.,	52	5	At home.
July 17	Morris McMennigle,	375 Scott St.,	21	4	Baggageman.
July 24	Neal McHugh,	375 Scott St.,	22		Laborer.
Aug. 2	Dan. Sheehan,	70 Kidder,	35	8	Miner.
Aug. 4	Anna Flynn,	304 Scott St.,	22	4	Bookkeeper
Aug. 16	Anna Conwell,	60 Baltimore Lane,	5	11	At home.
Aug. 21	Josephine Murphy,	56 Maxwell,	17	8	At home.

While Thomas Donlan got Leonard Milk this was long before Thoma milk was supposed to have been infected, although farmer John Place supplying Thoma was said to have been a walking typhoid case; but this is not credited. Thomas Donlan was taken sick June 4th, pronounced a typhoid case and admitted to Mercy Hospital June 13th, and discharged from there July 16th. He returned to work at the mine August 15th. He was an intimate friend of Edward Rehill. They went together up to Thomas' onset. Rehill subsequently contracted the disease, he being a case of secondary infection. Wm. Donlan was cared for at home, until August 19th when he was admitted to the hospital. William's case is believed to have resulted from household infection and also that his sister Mrs. McDonald of Sugar Notch, whose onset was August 8th. She visited the Donlans while they were ill at home. Thus these secondary cases followed the primary case of Thomas although the last two might have been caused directly through Thoma milk. Mrs. Andes got Rineman's milk; also from Loomis and the Farmers Dairy. No suspicion was attached to Loomis milk nor to the Farmers Dairy sources. Her husband ran a plumber's shop next door. Mrs. Andes was not acquainted with a typhoid fever patient and she was not away from home. She was the only one stricken in the family. Miss Murphy went to Harveys Lake on August 15th. She was taken sick at her sister's in Ashley where she was staying over Sunday. Anna Conwell was the only one of a family of 11 to contract typhoid. Leonard and Brown milk was used, but sparingly. Her case is considered secondary to that of her cousins, Ruth and Edith. Morris McMenningle is a baggageman at Lehigh Valley depot. He is a brother of Mrs. McHugh. The entire family came recently to America from Ireland. He was a constant companion of Neal McHugh. The family was supplied with Mrs. McGinley's milk and also Leonards, both from Vosburg. Morris was taken ill July 17th. Neal's case is supposed to be secondary. On July 19th Morris was admitted to the Mercy Hospital. The house was not fumigated. Neal who worked at the D. & H. Washery slept in the bed vacated by Morris. His case is considered secondary. Both might have been caused by Thoma milk. Daniel

Sheehan was employed as an electrical engineer at Black Diamond colliery. He drank water there frequently and the attending physician attributed the case to this cause. Daniel was the only one of a family of 8 to contract the disease. They were supplied with Brown and Leonard milk, both from Vosburg. Ann Flynn is not related to the Flynns on Hazel street. She kept books for her brother-in-law, J. S. Rice, electrical contractor. She was unacquainted with any typhoid fever patient except Bernhard Dressel, motorman, with whom she has a bowing acquaintance only. She had attended no picnics. Her physician reported Anna as much run down before the onset. The family was supplied with Brown and Leonard milk.

Thus while all nine cases might have been caused by infected Thoma milk, one of three had no other suspicious cause, four might have been secondary to this infection. One might have been mine water. One was attributed to Rineman's milk. One case was obscure.

PETER BROWN, DEALER. Peter Brown operates a milk route from 17 Worrall Street. He received from Thoma 80 quarts daily and from Nelson G. Bunnell, Washington Township 120 quarts daily. At the Bunnel farm unsanitary conditions were found and corrected by the Department inspectors. This milk was not suspected of transmitting typhoid infection. Mr. Brown supplies 146 customers, in 9 families of which typhoid fever occurred. In the following table data relative to these cases are given:

Typhoid Fever Cases on Brown Route.
Total Customers—146.

Date of onset.	Patient	Address.	Age.	No. in family.	Employment.
July 24	Wm. Johns,	351 New Grant St.,	23	5	Clerk.
Aug. 1	Edith Conwell,	132 Spring St.,	10	13	At home.
Aug. 1	Ruth Conwell,	132 Spring St.,	5		At home.
Aug. 2	Dan. Sheehan,	70 Kidder St.,	35	8	Miner.
Aug. 2	Raymond Murphy,	43 Pine St.,	18	8	Clerk.
Aug. 3	Bernard Dressel,	435 Scott St.,	25	6	Car conductor.
Aug. 13	Mary Fleming,	174 Scott St.,	28	6	Domestic.
Aug. 14	Frank P. Schuler,	118 Hazel St.,	25	10	Vulcan Iron Wks
Aug. 16	Anna Conwell,	60 Baltimore Lane,	5	11	At home.
Aug. 19	Margaret Adams,	3 Laurel St.,	10	5	At home.

William Johns is a clerk at the D. & H. Railroad office. He had not been out of the city and had no acquaintances who had contracted typhoid. Edith Conwell and her sister Ruth were the only two out of a family of 13 to be stricken. Their cousin Anna living nearby, (described under Leonard's customers) was secondary to them, it is thought. A cow was kept on the premises. Brown's milk was purchased occasionally. Meagre information only could be obtained. Edith and Ruth had the ambulatory form of the disease and were about most of the time. The Daniel Sheehan case is described under Leonard's customers. Raymond Murphy was employed in Gilless' china store. He had no acquaintances among typhoid patients, had frequented no resorts and all his meals had been taken at home where he had partaken of ice-cream. Bernard Dressel, street-car conductor, visited Harveys Lake July 4th and drank water from Burns' well, Parsons borough. The doctor was first called in August 4th and the second time on August 9th when the case was pronounced typhoid. He was the only one of a family of six affected. Mary Fleming a domestic drank freely of Brown's milk. There were no other suspicious causes connected with her case. Frank Schuler was employed as a machinist at the Vulcan Iron Works. August 7th he was at Sans Souci Park and on August 10th attended a picnic at Harveys Lake. He was there on July 24th also. Occasionally he went to Umberwurst's saloon. The keeper went down with typhoid on July 24th. Schuler drank Vulcan Spring water. Margaret Adams played around the neighborhood. None of her acquaintances had typhoid. She was the only one of the family afflicted. She was not fond of milk; used it in tea and coffee only.

Thus while all ten cases might have been caused by infected Thoma milk, six only had no other suspicious cause. One might have been from a well or Harveys Lake and one might have been Harveys Lake picnics or the Vulcan Spring or secondary from the saloon keeper. One might have been secondary and one from mine water.

HENRY MILLER, DEALER. Henry Miller conducts a milk route from 61 South Hancock street. He receives his supply from Thoma, getting 100 quarts daily there and 20 quarts from M. S. Allen, Montrose. The latter supply was investigated but not suspected. Mr. Miller supplies 87 customers daily. In 5 families only, did typhoid fever appear among his customers. Data concerning these cases are given in the following table:

Typhoid Fever Cases on Miller Route.

Total Customers—87.

Date of onset.	Patient.	Address	Age.	No. in family	Employment
Aug. 2	Jas. J. Morgan,	366 E. Northampton,	27	6	Fireman R R.
Aug. 8	Martin Voelker,	52 S. Hancock,	6	5	At home
Aug. 15	Kathleen Hanks,	45 Chester,	4	7	At home.
Aug. 26	Thos. Featherston,	7 Hays Lane,	31	2	Miner
Aug. 16	Amelia Schornstein,	517 N. Pa. Ave.,	15	7	At home

James Morgan was a locomotive fireman on the D. & H. Railroad. He died August 20th. He drank water at various places. Also purchased ice cream and fruit. He used Miller's milk with cereals. On July 23rd he attended a church picnic at Harveys Lake. His meals were taken at home. The doctor reported that the patient had not felt well for six months. Martin Volker drank Miller milk freely and to this source of infection the case is ascribed. Martin's father, clergyman, took the family to Riverside Park July 24th. The children waded in the river and washed their hands in the water below where sewage was discharged. Martin drank water from the pump. He was the only one of the family stricken. Knew no other cases. No typhoid appeared among members or attendants of the Reverend's congregation. Kathleen Hanks was a weak child from birth. She was taken to the hospital August 23rd. On August 1st the family had visited Ashley. Kathleen used milk in coffee only. She was fond of fruit and eat plentifully of bananas, purchased from Mahoney's store. Thos. Featherstone was employed at the Baltimore Mine, drank coffee there only, brought with his lunch from home. He did not frequent resorts. There is no other suspicious cause about his case than that of milk. Amelia Schornstein was one of a family of seven. Her brother George, had typhoid fever in January. She went to Towanda for a visit on August 7th and stayed until the 20th. While there, on August 16th, she was taken ill and came home to Wilkes-Barre on the 20th and went to bed, the doctor being called in. The case was pronounced typhoid fever August 31st. No other suspicious cause than Brown's milk was noted, except possibly the prior case in the family.

Thus while five cases might have been caused by infected Thoma milk, two only had no other suspicious cause. The origin of one case is relatively obscure. One might have been from Harveys Lake or fruit or from various waters although charged to milk and one might have been caused by sewage polluted river water.

KEYSTONE DAIRY. The Keystone Dairy Company deals wholesale and retail in milk, cream, butter and eggs at 45 North Main Street. A number of milk routes are operated and 740 regular customers are supplied. Typhoid fever appeared in 9 families only among the company's customers. The milk was produced at 9 farms, the Vosburg Creamery sources, and the Farmers' Dairy sources as appears in the following table:

Milk and Cream Supplied to Keystone Dairy Company.

	Quarts. daily.
Franklin township:	
1 B. Goldsmith,	170
Dallas township:	
2 Jane Worden,	60
3 Zura Hess,	80
4 David Kunkle,	40
5 Henry Geisleichter,	20
6 W. P. Kirkendall,	80
Dallas borough:	
7 Chas. Kunkle,	100
8 Fred Mosier,	80
9 Frank Smith,	60
Vosburg, Washington township:	
10 E. Thoma,	120
Wilkes-Barre city:	
11 Farmers' Dairy,	200 to 400
Qts. furnished daily,	1,210

(All cream from Farmers' Dairy.)

From this table it will appear that Thoma supplied ten per cent. of the milk. None of the other sources were suspected. The farms were investigated by local health officers under the direction of Dr. Miner. The Farmers' Dairy producers are mentioned under the Farmers' Dairy discussion. Data concerning the 10 typhoid fever cases among the Keystone Dairy customers are given in the following table:

Typhoid Fever Cases on Keystone Dairy Route.

Total Customers—740.

Date of onset.	Patient	Address	Age.	No. in family	Employment
July 7	Mary Levison,	29 Garnet Lane,	16	6	Cash girl
July 10	Nellie Dean,	44 Davis Place,	31	6	Clerk.
July 27	Bertha Schulte,	255 Park Ave.,	21	8	Silk mill
Aug. 10	Ruth Schlom,	147 S Wells St.,	7	5	At home
Aug. 17	Ethyl Schlom,	147 S. Wells St.,	8		At home
Aug. 11	Scott Van Horn,	15 Magnolia Ave.,	16	3	Clerk.
Aug. 20	Mike Mastrosonni,	269 Wells St ,	3	5	At home
Sept. 11	Mrs. C. O. Donnell,	180 Barney St.,	39	4	Housewife
Sept. 15	Lizzie Cordick,	160 S. Main,	30	7	Domestic
Sept. 18	John Jones,	141 Park Ave.,	26	3	Miner

Mary Levison had no typhoid acquaintances. She was employed at Jonas Long's Carpet Store. Excepting Saturdays, her meals were taken at home. The family got Farmers' Dairy and Keystone milk. Nellie Dean was a clerk at Lazarus Store, and sold Rineman's milk. She felt ill July 10th but worked at the store for one week thereafter. On July 21st, she was confined to her home and the case was reported typhoid fever July 26th. The family received Keystone milk. Nellie was the only one of six to contract the disease. The case is attributed to Rineman. Bertha Schulte was the only one of eight in a family to be stricken. She worked at Hess & Goldsmith's silk mill, Georgetown, and drank copiously of warm water there and complained because of lack of ice in the water. On July 4th, she picniced at Harveys Lake, carried her lunch, but ate ice cream and drank lemonade. About July 14th, she attended a picnic at Bear Creek. The suspicious thing about her case is that every week all during the season up to her illness on July 27th, she took frequent boat rides on the river and trailed her hands in the water over the boatside. This river is so polluted with sewage from the numerous outlets along the bank that the pollutions may be detected by the eye. Her case is attributed to the river contamination. Bertha knew no typhoid patients. Ruth and Ethyl Schlom ate fruit purchased of hucksters and some ice cream. The entire family of five went to Pocono Summit July 24th, returning July 30th. Ruth was taken down August 10th and Ethyl seven days later. While away the family drank from a spring. There was no suspicion of any other cause than Keystone milk, but it may have been infection from the huckster's products or the disease may have been contracted at Pocono Summit. Scott Van Horn was employed in the Times-Leader office. He bathed in the sewage waters of the river. His case is charged to this cause—see discussion under "Bathing in River." Michael Mastrosonni got fruit from various places and ice cream cones. He had no typhoid fever acquaintances. He had a mild case. The infection may have come through Thoma milk which the family purchased at Regans store or from the Keystone dairy. The fruit or ice cream might have been the medium of transmission. Mrs. O'Donnell was always at home. Her husband is proprietor of a confectionary store on the premises. He handled the milk sold to a few customers. It came from the Keystone Dairy. The family drank Pocono bottled water. They ate some ice cream. Mrs. O'Donnell was not fond of it. She was taken to the Mercy Hospital on September 15th. Lizzie Cordick was a domestic in the home of Harry Rockwell. She went to Luzerne every week. There was no suspicion of any cause of her case other than Thoma milk. John Jones had a mild case. He was employed at Murray's mine No. 2; he carried his meals and tea from home. However, he frequently ate at lunch wagons and drank much milk. Case obscure.

Thus three cases only of the Keystone typhoid customers had no other suspicious cause than Thoma milk, but six are attributed to this infection. One is charged to Rineman; one is attributed to bathing in the river; one might have come from boating on river or picnicing at Harveys Lake; two from huckster's products or Pocono Summit; one from fruit or ice cream cones and another possibly from fruit.

MISCELLANEOUS CUSTOMERS OF THOMA MILK.—In the following table appear miscellaneous dealers using some Thoma milk and the cases of typhoid fever among their customers. These eleven smaller dealers supplied about 500 families, in 17 of which typhoid fever occurred, totalling 22 cases.

Date of onset.	Patient.	Address.	Age.	No. in family.	Employment.	
1 John Dougher, dealer, 23 N. Wells St., 93 customers.						
Aug. 1	Carl Adolph,	51 N. Wells St.,	5	8	At home.	1
Aug. 6	Harry Adolph,	51 N. Wells St.,	20		Mechanic.	2
Aug. 7	Wm. Adolph,	51 N. Wells St.,	12		At home.	3
Aug. 7	Emma Adolph,	51 N. Wells St.,	15		At home.	4
2 Harrison and Son, dealers, 33 Mill St., 106 customers.						
July 13	Mary Loftus,	29 E. Northampton St.	33	3	Milliner.	5
July 14	Louis Rinker,	27 Walnut St.,	39	4	Mail carrier.	6
Aug. 26	Wm. Abraham,	312 High St.,	32	6	Laborer.	7
3 Von Bursch and Son, dealers, 408 S. Main St., 41 customers.						
Aug. 7	Mrs. Ed. Delaney,	85 S. Wells St.	23	5	House-wife.	8
Aug. 12	Genevieve Boyle,	85 S. Wells St.	13		School.	9
4 E. M. Bartikowski, dealer, 220 Stanton St., 7 customers.						
Aug. 10	Eliza Perry,	105 Jones St.,	7	7	At home.	10
Aug. 11	Anna Austin,	210 Stanton St.,	18	12	At home.	11
5 Mrs. McGinley, dealer, Scott St., few customers.						
July 17	Morris McMennigle,	375 Scott St.,	21	4	Baggageman	12
July 24	Neal McHugh,	375 Scott St.,	22		Laborer.	13
6 R. G. Williams, dealer, 508 Carey Ave., about 50 customers.						
Aug. 30	Fanny Hayden,	121 Carlisle St.,	7	3	At home.	14
7 Jos. Schneider, dealer, 523 N. Penn Ave., 34 customers.						
Aug. 6	Rev. W. J. Nelson,	319 N. Washington St.	33	7	Clergyman.	15
Sept. 8	Wm. Burkert,	160 Scott St.,	13	7	At home.	16
8 Mrs. Barbara Schimpff, dealer, 213 N. Washington St., 21 customers.						
Aug. 14	Hanna Titus,	329 N. Wash. St.,	51	9	Housewife.	17
Aug. 15	Rosa Becker,	246 N. Wash. St.,	14	7	School.	18
Aug. 22	Martin Schneider,	191 N. Wash. St.,	17	7	Painter.	19
9 Mrs. Lizzie Lauser, dealer, 598 Hazle St., 14 customers.						
Sept. 1	Nicholas Rittenmeyer,	403 McLean St.,	24	6	Miner.	20

TYPHOID FEVER CASES—Continued.

Date of onset	Patient.	Address.	Age	No in family	Employment.	
10 Mrs. C. O'Donnell, dealer, 346 Scott St., 13 customers.						
July 2	Kate Cawley,	348 Scott St.,	30	9	Domestic.	21
11 J. Regan, dealer, 265 S. Wells St., no regular customers.						
Aug. 20	Mike Mastrosonni,	269 Wells St.,	3	5	At home.	22

Dealer Dougher obtained milk from Thoma and from Harvey Place and A. Garrison of Osterhaut village or LaGrange, Tunkhannock, township, Wyoming County. The farms were inspected by health officers. Thoma milk only was suspected. Four cases of typhoid fever appeared in the Adolph family. The last three were secondary to that of Carl. Carl was in bed five weeks and was treated for malarial fever. Customary precautions were not taken. When the other three members were stricken, the doctor decided that Carl had typhoid. He had made no visits and no typhoid existed among his acquaintances except Harry Baur, 21 years of age, who had moved to another part of the city. Carl ate ice cream cones and used milk freely on cereals. The supply came from Dougher and from Mrs. Goodstein who kept four cows and ran a little grocery store at 32 N. Hancock street. She sold milk to transient customers without a license. Carl's might have been from Thoma infection or from ice cream.

Dealer Harrison obtained his supply from Thoma and C. F. Taylor of Vosburg. Also from H. A. Allen of Mehoopany. These two farms were inspected. Mary Loftus conducted a millinery store in the front part of the dwelling. She had been treated for stomach trouble all summer. She called in a new doctor July 18th when she took to her bed. On July 23rd the case was diagnosed as typhoid fever and she was removed to the hospital. Fruit was purchased at a fruit corner stand. The milk came from Hillside farm and from Harrison. The Hillside farm milk was not suspected. Miss Loftus has not been out and about any. The case was attributed to Thoma milk. Louis Rinker case was attributed to Rineman's milk. Wm. Abraham was employed at the wire rope mill. He drank freely of milk at home and got fruit at a store. The family used Vulcan spring water. William was sick from August 26th until September 4th at his home and was then taken to Mercy Hospital. No other member of the family contracted the disease.

Dealer Busch used Thoma milk only. The only case among his customers was in the Boyle family. Mrs. Delaney a married daughter lived in the family. She was taken sick five days before Jenkin Boyle. The family has received no visitors and had not frequented parks. Bought bananas and vegetables from street venders. Used one pint of milk daily.

Dealer Bartikowski furnished Keystone and Farmers' dairy and Thoma milk. Two of his customers had typhoid. He had seven customers in all. Elizabeth Ferry got Thoma milk through Sheehan also. The case was attributed to Thoma's milk, there being no other suspicious circumstances; but the family used Stoltz milk from Farmers' Dairy and Kresge milk from Wyalusing creamery. Anna Austin worked at home and had not been away any where except twice during the latter part of July when she was at San Souci Park and drank water freely from the public places. Her brother Norman went swimming in the sewage polluted river every day. The family milk supply was obtained from Bartikowski and from Kresge who furnished Wyalusing creamery milk and from Nagle who sold Farmers' daily milk. The girls often purchased butter milk from Foster's bake shop. Foster got the supply from farmers at Black Walnut. The disease might have been contracted at the park. It is ascribed to Thoma milk.

Dealer McGinley had two cases among her customers. She used Thoma milk only. McMennigle got Thoma milk from Leonards and occasionally from McGinley. His case is attributed to Thoma milk, and Neal McHugh in the same family is ascribed to secondary infection.

Dealer Williams received milk from Thoma and from Love and Dexter, Black Walnut farmers. These farms were inspected and no suspicion attached to the milk. Only one of Williams customers had typhoid fever. Fannie Hayden liver with her grandmother Mrs. Davis. She partook of Beckers and other ice creams. Fannie attended several picnics in July and August and frequently visited her grandmother Jackson on McLean street. The origin of the infection is obscure, it might have been Thoma milk.

Dealer Schneider got milk from Thoma and from the Standard Butter company. Among his customers there were two cases of typhoid fever. Rev. Mr. Nelson had no suspicious circumstances connected with his case that would point to other infection than that possible from Thoma milk. Wm. Burkert got ice cream and fruit from various places including hucksters. Had no typhoid acquaintances. He had suffered with bowel trouble all summer.

Dealer Schimpff got milk from the Keystone dairy, the Farmers' dairy and from Thoma. Among her 21 customers there were three cases of typhoid fever. Hannah Titus lived but two doors above Mr. Nelson. Her daughter Ruth played with Emily Nelson at both homes. The Tituses say that Mr. Nelson was feeling ill for two weeks prior to August 6th. Ruth stopped playing with the Nelson children August 10th. Mrs. Titus was run down and had felt ill all summer. There might have been transmission of contagion between the typhoid cases in the two homes. It is mere speculation. Her case is ascribed to Thoma milk. Rosa Becker's family got milk from John Alles who obtained his supply from farmers at La Grange and from the Standard dairy also from Schimpff and occasionally from Mrs. Dampfer who handles Farmers' dairy milk. The only milk suspected of being infected was that of Thoma. Rosa was the only one of a family of seven to contract the disease. She was at Riverside Park the first week in August and had her hands in the sewage polluted water of the river. She was fond of ice cream cones and ate them at Kirby's store. She attended a church picnic at Harveys Lake on August 10th. Rose was taken sick August 15th. The next day the doctor was called in but he did not pronounce the case as positive typhoid until the 21st. The case might have been caused by Thoma milk, or it might have been contracted at the river. To the latter it is charged. Martin Schneider was an intimate street companion of Rose Becker's brother. He used milk only in tea and coffee. Buttermilk was obtained from Farmers' Dairy The case could have been caused by Thoma milk, so it is believed

Dealer Lauser got Thoma milk through Geo. Sheehan. Dealer O'Donnell got Thoma milk through Leonard and Dealer Regan purchased his supply from the Keystone dairy that received Thoma milk. Among each of these dealers there was a typhoid customer. Nicholas Rittenmyer's case is obscure. He worked at the Franklin colliery. Did not drink milk but partook freely of ice cream made at Becker's restaurant. He had attended no picnics but had frequently purchased fruit from hucksters. Kate Cawley was a domestic at Mr. Rishell's residence where she drank milk freely produced on Mr. Rishell's farm. On July 20th, 12 days before the onset, she left the employ of Mr. Rishell and went home to her sister's family on Scott Street. Here she drank milk freely purchased of O'Donnell at a store. To this cause the disease is attributed. Mastrosonni's case is ascribed to Thoma milk and mentioned under the Keystone dairy discussion.

In the following table is given a grand statistical summary of the suspected origin of typhoid fever cases among the customers of Edward Thoma milk as hereinbefore described in detail:

Statistical Summary.

Suspected Origin of Typhoid Fever Cases Among Consumers of E. Thoma Milk.

Suspected Origin.		No. of Typhoid Cases.	
Thoma milk,		36	42 city cases to Thoma milk.
Secondary:			
To Thoma milk,		6	
To other origin,		1	
Water:			
Vulcan Spring,		2	
Mine water,		1	
River:			
Bathing, boating and washing,		4	
Obscure or unknown,		7	
Actual cases,		57	
Duplicates,	6		
Rineman—previously discussed,	3	9	
Total number of reported cases partaking of Thoma milk,		66	

d. Sources of Milk Supply in the City of Wilkes-Barre.

EXPLANATION.—No department of Wilkes-Barre City Government keeps a registry of the producers of the milk supply. A list was secured from a report of inspectors made in 1909 by the State Live Stock and Sanitary Board. This, though not correct for the present season, served as a basis for field operations. In the following table are given the places of shipment and the number of producers prepared from this list:

Sources of Milk Supplies to the City of Wilkes-Barre from Towns in Pennsylvania and New York.

Prepared from data in 1909 Report of State Live Stock and Sanitary Board.

County.	Places of Shipment.	No. of Producers.
From towns in Pennsylvania:		
Luzerne,	11	41
Wyoming,	12	106
Bradford,	9	71
Susquehanna,	1	1
Columbia,	1	1
Totals,	34	220
From towns in New York:		
District:		
Newark Valley,		72
Berkshire,		32
Totals,		104
Grand Totals,	34	324

Among the customers of the remaining 42 city dealers, hereinbefore cited, there were 91 typhoid fever cases reported. The number, during the midst of the fight to suppress the out-break, was not accurately known, but evidently it was large and there was a well-grounded fear of a general milk infection. The work of tracing the milk back to sources and of inspecting conditions there and of removing all danger at the farm, if any were found, was undertaken by the Department. The New York State authorities looked into the Wilkes-Barre sources in that State with negative results.

Every estate in the counties of Luzerne, Wyoming and Bradford, upon which milk was produced, was inspected by local health officers. As the reports came in day by day, no typhoid fever was found existing at these farms and this was confirmed at the conclusion except in the instances noted. Meantime, the principal creameries in the country at which the milk is collected and from which it is shipped to the city were visited by the Department's inspectors. Many changes in methods of handling milk at the creameries and now and then at the farm were instituted by the Department. Sterilization of utensils was required and this led back to the city where numbers of arrests were made for failure to comply with city ordinances regulating the handling and sale of milk. Following is a report of these operations:

MAJOR SOURCES.—The creameries are the major sources of supply. Those investigated are stated in tabular form.

Creameries Investigated by the State Department of Health During the Typhoid Fever Epidemic of 1910.

1	Centre Moreland Creamery,	Wyoming county.
2	Meshoppen Creamery,	Wyoming county.
3	New Era Creamery,	Bradford county.
4	Lake View Sub-Station,	Bradford county.
5	Wilmot Sub-Station,	Bradford county.
6	Shannon Hill Creamery,	Susquehanna county.
7	Standing Stone Creamery,	Bradford county.
8	Vosburg Creamery,	Wyoming county.
9	Wyalusing Creamery,	Bradford county.

CENTRE MORELAND CREAMERY COMPANY.—The Centre Moreland Company, located at Centre Moreland village, North Moreland township, Wyoming County, is managed by Mr. Shook, a recent graduate of the Pennsylvania State Agricultural College. The equipment of the establishment is quite complete and arranged in a scientific manner. The building is a wooden structure 30 by 50 feet in plan. The floor is of cement and slopes to the centre where there is a drain leading to a run. Milk and cream are received between 7 and 9 o'clock in the morning. There is an outside platform at the back of the building provided for the purpose at a proper height for wagons. Through an opening the milk is poured into a weighing vat on an inside platform elevated 7 feet above the floor of the creamery. After weighing, the milk is delivered to a receiving vat six feet long, 3 feet wide and 14 inches deep, lined with tin and having a partition through the middle. One side is for milk and the other for cream that is separated before it reaches the creamery. The pasteurizing vat is lower and cream is delivered by gravity from the receiving vat into it through a spigot. The milk is piped by gravity to the separator direct and thence to the pasteurizing vat. The latter is in two parts, so made that one fits into the other, leaving between a water and steam tight space. The cream is placed in the vat with the radiating space filled with water at a temperature of 120°. Live steam is then turned into the water and the temperature raised gradually to 160°. Meanwhile the cream is continually stirred to equalize the temperature. It is then put in 20 and 40 quart milk cans and is hauled by wagon from the creamery to Shavertown about 6 miles, where a Mr. Baldwin transfers the cans to his wagon and brings the cream to Dorranceton.

In the creamery is a 10 horse-power boiler and an 8 horse-power engine. In the building there is a churn and an ice cooler that have not been used since June. Everything coming in contract with the milk or cream is washed thoroughly with cold water, then with warm water and sal-soda compound and finally is sterilized over live steam immediately before using. Live steam is run into the receiving and pasteurizing vat and separator. The skim milk is placed in a tank in the yard and farmers take it home. The same cans in which the milk is brought to the creamery are usually used for this transportation. The water used in the creamery comes from a spring on the property and is piped by gravity to the building. Twenty-three farmers produce the milk. About 1,300 pounds of milk daily are delivered to the creamery and 200 pounds of cream from the farms.

Producers.	Village.	Township.
6	Vernon,	N. Moreland.
10	Centre Moreland,	N. Moreland.
1	Cresson,	N. Moreland.
2	Keelersburg,	N. Moreland
3	Thurston,	Eaton.
1	Alderson,	Dallas.

MESHOPPEN CREAMERY.—This creamery is located at Meshoppen borough on the Lehigh Valley Railroad, Wyoming County. It is owned and operated by the Farmers' Dairy Company of Wilkes-Barre, and managed by Edward Williams, Supt. The milk is brought in by the farmers and emptied into company cans. The farmers take their own cans back to the farm and cleanse them there. The company sets its milk cans in a tank filled two-thirds full of ice water. This cooler has about a capacity of 50 cans. Twenty-five hundred quarts daily are shipped by train to Wilkes-Barre. The empty cans belonging to the company were not clean. There was a perceptible odor of decay about them. Under the direction of a Department inspector on September 15th, seventy-one company cans and sixty-eight producer's cans were cleaned and sterilized and on the following day the process repeated. Also on September 17th.

Analyses of Milk and Water—Meshoppen Creamery—1910.

Date of collection.	Sample and Remarks.	Bacteria per c. c.	
		Total.	B. Coli.
1910			
Sept. 15	Milk from can on E. S. Bunnell's wagon,	4,300,000	35,000
Sept. 15	Milk from can on Frank Northrop wagon,	90,000	300
Sept. 15	Milk Co's. receiving can before pasteurization,	16,800	3,000
Sept. 15	Milk cooled after pasteuriaztion,	6,000	25
Sept. 16	Milk from can on E. N. Bennet's wagon,	8,400	1,350
Sept. 16	Milk from can on B. C. Robert's wagon,	40,000	26,000
Sept. 16	Milk from can on A. B. Clayton's wagon,	1,500,000	540,000
Sept. 16	Milk from can on E. Burk's wagon,	12,000	4,400
Sept. 16	Milk Co's. receiving can before pasteurization,	4,300,000	1,620,000
Sept. 16	Milk cooled after pasteurization,	63,000	300
Sept. 15	Water at tap over wash vat,	40	0
Sept. 15	Water from milk cooler,	8	0
Sept. 14	Milk from creamery, sample collected at Wilkes-Barre,	3,000	33

Forty-two farmers produce the milk. They live in the suburbs of the borough or out in Meshoppen township. Their premises were all inspected by the local health officers.

NEW ERA CREAMERY COMPANY.—The New Era Creamery is located in New Era village, Terry township, Bradford County. Mr. Lyons is the manager. At the time of the Department's inspection, September 15th, twenty-four farmers were bringing milk daily to the creamery where it was passed through a separator. The cream was pasteurized and the skimmed milk returned to the farmers. Fourteen other farmers brought in sour cream and from this cream butter was made.

The New Era Creamery also received from the sub-station "Wilmot" and from the sub-station at Lake View. The Wilmot creamery furnishes sour cream only for the making of butter. The Lake View Creamery furnishes two 46 quart cans of cream each day. At this place milk is obtained from 16 farmers and separated and the cream is pasteurized at a temperature of 195°. It is then brought to the New Era Creamery and usually it is sent to New Jersey. Occasionally some goes to Wilkes-Barre.

From the New Era Creamery are usually shipped eight 46 quart cans of cream each day to the Farmers' Dairy Company of Wilkes-Barre. This cream is pasteurized and shipped in cans sealed by wire and lead. Other cream goes to Jersey City. Thus usually the only cream or milk reaching Wilkes-Barre from the New Era Creamery comes from the farmers delivering milk at the New Era Creamery.

The building is an old one and in poor condition. The floor is of wood and broken through in many places. There is scanty room to do the work and to keep things clean. Cans received from Wilkes-Barre and other places and all of the utensils are washed in water heated by steam and then placed over a steam jet for three-quarters of a minute. On September 15th seven cans were received from the Farmers' Dairy Company of Wilkes-Barre. Three of them were decidedly unclean. From all appearances one of the cans had not been rinsed after the cream was poured out. It was in a sour and foul condition. The other two cans had probably been rinsed but not cleansed with hot water and brush. Mr. Lyons stated that it was almost impossible to properly cleanse a can in this filthy condition. It usually takes two days to prepare such cans for cream. More than one steam jet should be provided, so that a longer time can be taken in steaming each can.

A Department inspector was stationed at the creamery to oversee a thorough sterilization of all cans and utensils. The farmers were instructed in the matter of cleaning their cans at home. The creamery's water supply is from a drilled well.

LAKE VIEW SUB-STATION.—Here spring water is fed to the building by gravity. Empty cans coming there first pass through New Era and the Department ordered their sterilization at New Era Creamery. The Lake View Creamery building is new and in good condition. However, it is not equipped with a steam jet. Mr. French in charge is competent to do excellent work and from the appearances the creamery is well conducted. Ice is plentiful and the cream is kept thoroughly cool. About 5 P. M. the filled cans are taken to New Albany and sent from there to Wilkes-Barre, arriving about midnight.

The manager makes a distinction among the farmers supplying the New Era Creamery. Those having the best dairies are requested to bring fresh milk or sweet cream. Those considered a poorer class of dairymen are requested to furnish sour cream or milk out of which butter is made.

Analyses of milk, cream and water made by the Department are given in the following table:

Analyses of Milk, Cream and Water.—New Era Creamery and Lake View Creamery—1910.

Date of collection.	Samples and Remarks.	Bacteria Per C. C. Total.	Bacteria Per C. C. B. Coli.
1910.	New Era Creamery.		
Sept. 15	Cream before pasteurization,	2,500,000	0
15	Cream after pasteurization. Composite sample from 8 cans prepared during the morning of Sept 15,	12,600	12
15	Water from well,	10	0
17	Milk, composite sample 22 farmers product,	9,500,000	1,200,00
17	Cream after pasteurization,	180,000	0
17	Milk from Geo. F. Horton dairy,	8,000,000	0
	Lake View Creamery.		
Sept. 15	Cream pasteurized, taken from 3 cans,	650,000	1,20
15	Water from spring,	50,000	0

The Department recommended that the New Era Company provide itself with a suitable and fully equipped building. The Farmers' Dairy was seen at Wilkes-Barre and ordered to properly cleanse their cans before returning them to the creamery.

SHANNON HILL CREAMERY.—The Shannon Hill Creamery, located out in Auburn township, Susquehanna County, is owned and operated by the Farmers' Dairy Company of Wilkes-Barre, the resident superintendent being Harry White. The building is new and has a concrete floor. The windows and doors are not screened. On September 15th, when the Department made its first inspection, flies were thick about the premises. The water supply comes from a spring in an open field where cows are pastured. It is subject to surface pollution as the analyses show. The water is pumped to the creamery and is used for cooling, washing and the making of steam. The cooling apparatus consists of a parallel plate aerator and a tin-lined vat through which water is kept flowing. No ice is used on the premises. Approximately 2,000 quarts of milk are brought in by 25 producers each morning about dawn, immediately weighed and run through the separator, the skimmed milk is given back to the farmers who take it home in the same cans, and the cream is at once placed in cans and carted by wagon during the forenoon to the Meshoppen creamery for shipment. For a few hours the filled cream cans are placed in the cooling vat which has a capacity of about ten cans. The farmer drives up to an outside platform and a zinc tub resting on scales is wheeled to the door where the milk is poured into and weighed. Next the tub is wheeled to the receiving vat and the milk is permitted to run out through a faucet into the open vat from whence it passes through the separators and thence to the pasteurizing apparatus where the cream is treated. The skimmed milk flows by gravity into the farmers' cans placed at the separator. From the following analyses of milk, cream and water, one may judge that higher standards of sanitation are necessary at farms and at the creamery. The Department stationed an officer at the building, and on September 16th and 17th a thorough cleansing operation and sterilization of the farmers' cans and the company's cans and utensils was instituted.

Analyses of Milk, Cream and Water at the Shannon Hill Creamery 1910.

Date of collection.	Samples and Remarks.	Bacteria Per C. C.	
		Total.	B. Coli.
Sept. 14	Cream in cans,	21,000,000	600,000
15	Milk from receiving vat,	2,300,000	480,500
15	Milk after pasteurization,	120,000	750
15	Cream from separator,	2,300,000	375,000
15	Water—Spring supply,	150	2
15	Water—Cooling vat,	14,000	100
15	Water—Hot water tank,	20,000	0
18	Milk—Weighing tub,	3,000,000	975,000
18	Milk—Receiving vat,	6,200,000	2,700,000
18	Cream from separator,	10,000,000	350,000
18	Cream before pasteurization,	3,800,000	310,000
18	Cream after pasteurization,	420,000	13,500
18	Water from spring,	35,000	40

The company has not provided a steam jet for sterilizing cans and utensils before September 15th. The Department had one installed and superintended the work. If washing compounds were used before they were not in evidence on September 15th.

STANDING STONE CREAMERY.—Standing Stone Creamery is located at Standing Stone village, Bradford County, is owned and operated by the Farmers' Dairy Company of Wilkes-Barre, John Hartman placed in local charge. On September 15th, when the Department made the inspection, milk was being received from 28 farmers in the amount of 1,600 quarts each day. The milk is bottled on the premises or placed in cans. It is not separated or treated. A daily shipment of milk is made to Jersey City. The milk that is not needed to fill this order is sent to the Farmers' Dairy Company at Wilkes-Barre, amounting usually to from eight to eleven 40 quarts cans each day. The milk shipped to Jersey City is put up in bottles at the creamery. Evening milk only is shipped in cans. The morning's milk is placed in company cans and these are packed in ice. The following morning it is put up in bottles. The evening milk is shipped the following day. The creamery and dairies producing the milk are inspected by New York officers.

The creamery building is an old one of ample size, located close to the Lehigh Valley Railroad. The cans and bottles are washed in steam and heated water. The cans are then steamed over a live steam jet for three minutes. The bottles are placed in boiling water for a few minutes and they are then suspended on pegs to drain and dry. The steam pressure is maintained at about 50 pounds. The water supply comes from a drilled well. A sample of the milk from this creamery was obtained from the Wilkes-Barre store on September 14th. It contained 540,000 total bacteria and 30,000 B. Coli per c. c.

WYALUSING CREAMERY COMPANY, LTD.—The Vosburg Creamery is described under Thoma's Milk Discussion. The Wyalusing Creamery is located in Wyalusing borough, Bradford County. Mr. John J. Becker, restaurant and bakery proprietor of Wilkes-Barre, is the principal owner and principal user of the creamery products. His city places of business are at 18 East Market street and 32 West Market street.

During August about 1,500 quarts of milk were daily received at the creamery and about 200 quarts of cream. The building is a frame structure located adjacent to the passenger station of the Lehigh Valley Railroad. At one end there is an ice house for the storage of ice used in the creamery and in the other end is a steam boiler plant; intervening are the receiving and cooling rooms.

The cream and milk are brought in by the farmers in their own cans which are taken off the wagon on to the receiving platform in the rear of the building. The skimmed milk is received by the farmers at this platform and carted out into the country and used for various purposes. The company harvests its own ice and none of it comes in contact with the dairy products. Each producer waits for his can to be emptied and takes it away. The measuring rod is made of metal about 2 feet long and is hung up on the wall in the receiving room. A cloth is used to cleanse the rod after each measurement, this rod being inserted into the milk in the can to determine the depth. There are flies in this room. The farmers keep their night and morning milk in separate cans and this separation is continued at the creamery provided the milk is to be shipped as such, otherwise, it is deposited in the receiving vat, a tin-lined trough 18 inches deep, 2 feet wide and 10 feet long. Milk to be skimmed is poured from the farmer's can into this trough and from thence it is raised by a brass pump to the height of 3 feet to a tank 4 feet long, 18 inches wide and 6 inches deep in which the milk temperature is raised to about 56° F. Thence the milk is permitted to flow by gravity to the separator. The cream is put in 40 quart cans packed in ice boxes and stored in the dry vats in cooling room provided it is not immediately shipped from the premises. The skimmed milk is collected in old cans, not used for other purposes, which are placed outside the building on the receiving platform. There is a pasteurizing apparatus on the premises which has not been used since the first part of July, so it is reported, for the reason the production of the creamery is short and no need for storage of the cream on the premises. It is all shipped away at once. Whenever cream is to be stored for any length of time it is first commercially pasteurized. There is a small cylinder, steam jacketed, which receives the cream to be pasteurized and therein it is subjected to about 180° temperature for a minute or more and thence it is run to a cooler, merely coils of cold water pipe over which the cream falls and cools, it is then collected in the creamery cans, packed in ice and stored in the dry vat room. Sometimes this cream is kept on the premises for 4 weeks before shipment.

In the season of productive yield of milk in the district butter is manufactured at the creamery.

The milk received from the farmers to be shipped away as milk is first poured into creamery cans and placed in the wet vats in the cooling room. These vats are made of wood and the water in them is about 18 inches deep. The cans are immersed in this iced water.

The water supply for the creamery is obtained from an artesian well located on the premises and drilled to the depth of about 90 feet. The water is pumped into a zinc tank by means of a rubber hose which is coiled up when not in use. The tank is suspended from the ceiling and reached by a ladder. This tank is about 4 feet long, 2 feet wide, and 2 feet high. There are no pipes extending to or from it throughout the building and there is no running water at the establishment. The water is also pumped into the sterilizing tank through fixed pipes. Drinking water at the railroad station is carried by bucket from the hose and placed in a cooler.

The products of the creamery are shipped to Wilkes-Barre, Pittston and Hazelton in 40 quart cans. In the following table are given the names and amount of milk and cream supplied daily to customers:

Name.	Address.	Milk.	Cream.
J. J. Becker,	Wilkes-Barre,		6 to 9 cans.
Chas. Kresge,	Wilkes-Barre,	4 to 5 cans,	Special order.
J. F. Boyle,	Pittston,	1 can,	Special order.
J. J. McHale,	Pittston,	2 cans,	Special order.
L. T. Harter,	Pittston,	1 to 3 cans,	3 to 6 cans.
R. S. Probert,	Hazleton,	3 to 4 cans,	Special order.
M. Cossman,	Pittston,	2 cans.	None.

Each can holds 40 quarts.

There are two trains daily which stop at Wyalusing on which creamery products are shipped. Most of the business is done on the 7.44 morning train. It arrives in Wilkes-Barre at 9.50 A. M. This train takes on milk at all stations. The afternoon train is at 5.23.

Each can has the name and address of the creamery stencilled upon it. The cans are returned mostly on the morning train which arrives at Wyalusing at 9.49. The cans which arrive on the 2.45 P. M. and 6.45 P. M. trains are left out on the railroad platform until the next morning. The washing of utensils about the creamery is done in a wooden tank into which hot water is placed by means of buckets. After the first cleaning of utensils such as the milk funnel and strainer, dippers, buckets, lids from cans, etc., they are deposited in the sterilizing tank, a wooden trough 4½ feet long, 2 feet wide by 8 inches deep, provided with a cover, filled with water to about 4 inches of the top. Live steam is admitted at about noon and not removed until the next morning. The cans unloaded from the trains are deposited on a platform at the creamery. Early next morning they are washed and sterilized, a pail of hot water containing two measures of a washing compound (Swiss Creamery Cleanser) is used. About two-thirds of the contents of the bucket is poured into a can and the inside is scrubbed with a fibre brush. This solution is then poured into other cans successively until four cans have been rinsed, cleaned and scrubbed in this manner. The remaining one-third of the solution is left in the bucket and used to cleanse the outside of the can but a separate brush is used for this purpose. The covers are washed in the first tank mentioned and then put into the sterilizer. For sterilizing the cans live steam is used. There is an iron pipe having 7 holes spaced uniformly apart. This pipe is connected with a rubber hose leading to a steam pipe in the building. This perforated pipe is clamped to the platform during the sterilizing operation, the steam is turned on and the cans are set over the live steam jets and kept in this position for several minutes. They are then taken into the receiving room and stacked up ready for filling. The lids are placed in racks for the purpose in the cooling room where the cans are filled either with milk or with cream. There are no screens in the doors or windows and flies are numerous on the platform and in the receiving room. Some of them fall into the milk trough and pass to the separator.

Before the Department's inspection one steam jet was used to sterilize the cans, and the covers were not sterilized. They were washed only, also the other utensils. Now the changed conditions in the steam sterilizing facilities are ample to cleanse and sterilize not only the creamery utensils, but also the cans of the farmers.

In the following table are given the names, addresses and data relative to the producers of milk and cream brought in daily by the producers to the Wyalusing Creamery:

No.	Name.	Township.	Post Office.	Cows.	Quarts.	
					Milk.	Cream.
1	J. B. Stalford, Est.,	Wilmot,	Wyalusing, R. D.,	28	112	------
2	Blocker Bros.,	Wyalusing,	Wyalusing, 39,	28	78	------
3	H. M. Lyons & Sons,	Wyalusing,	Wyalusing, 39,	37	136	------
4	N. H. Seymore,	Terry,	Wyalusing borough,	18	54	------
5	O. W. Newman,	Wyalusing,	Wyalusing borough,	8	10	------
6	C. H. Black,	Wyalusing,	Wyalusing borough,	10	40	------
7	H. L. Layman,	Terry,	Wyalusing, 40,	10	32	------
8	W. F. Stroud,	Terry,	Wyalusing borough,	9	26	------
9	G. G. Jackson,	Wyalusing,	Wyalusing,	30	59	------
10	L. D. Chamberlin,	Wyalusing,	Wyalusing, R. D. 39,	12	------	30
11	Nettie L. Holton,	Wyalusing,	Wyalusing, R. D. 39,	11	49	------
12	J. E. Jackson,	Wyalusing,	Wyalusing borough,	5	32	------
13	G. R. Howard,	Wyalusing,	Wyalusing, R. D. 39,	12	57	------
14	S. S. Brown,	Wyalusing,	Wyalusing borough,	3	20	------
15	Chas. Stalford,	Wyalusing,	Wyalusing, R. D. 40,	4	46	------
16	R. K. Stalford,	Wyalusing,	Wyalusing borough,	13	44	------
17	Louis VanLuvanee,	Wyalusing,	Wyalusing borough,	7	------	8
18	Asa Chamberlain,	Wyalusing,	Wyalusing borough,	6	20	------
19	Wm. Sharts,	Wilmot,	Sugar Run, 42,	18	32	------
20	John Turner,	Wilmot,	Sugar Run, 42,	12	38	------
21	A. M. Warburton,	Wilmot,	Sugar Run, 42,	10	------	30
22	Ed. Ashcraft,	Wilmot,	Sugar Run, 42,	6	20	------
23	W. T. Mitten,	Wyalusing,	Wyalusing, 39,	14	------	10
24	Frank H. Chamberlain,	Wyalusing,	Wyalusing borough,	14	------	12
25	L. C. Overton,	Wyalusing,	Wyalusing, 39,	9	------	8
26	John Crandall,	Wyalusing,	Wyalusing, 38,	14	42	------
27	W. S. Boyd,	Wyalusing,	Wyalusing, 39,	9	------	8
28	R. E. Junk,	Wyalusing,	Wyalusing, 39,	8	------	8
29	Morris Dodge,	Wilmot,	Sugar Run,	6	50	------
30	Clyde Frutchey,	Wilmot,	Sugar Run,	10	18	------
31	P. M. Deitrich,	Wilmot,	Sugar Run,	22	67	------
32	B. S. Deitrich,	Wilmot,	Sugar Run,	12	67	------
33	Clyde Brown,	Wyalusing,	Wyalusing borough,	10	24	------
34	H. C. Crandall,	Terry Twp.,	Wyalusing, 40,	9	------	10
35	F. G. Ackerly,	Wyalusing,	Wyalusing, 40,	21	60	------

Mr. G. A. Babcock operates a freight wagon service along the road from Wyalusing to LeRaysville. He collects cream from certain farmers who have separators on their property, and delivers it at the Wyalusing Creamery every other day. The farm of each producer was inspected by an officer of the Department. The health of the members of the household was made a subject of inquiry, source of water supply was examined, also methods of disposal of sewage and household wastes, and the general sanitary conditions were noted. Proper attention was bestowed upon the methods of conducting the dairy and the collecting and shipping of milk and cream. In a number of instances the cans were being sterilized at the creamery, and in other instances this was being done at the farm house. There were other cases where only hot water was used to cleanse the cans and utensils. Instructions were given by the inspectors that all pails, cans and milk utensils should be properly sterilized each day. Orders were also issued at the creamery for the cleaning and sterilizing with live steam all the farmers' cans. It is worthy of remark that in not a single instance was a farm visited where any sickness has occurred during the year and where the sanitary conditions and cleanliness of the occupants were not far above the average. The owners received the inspectors in a kindly spirit and a number of them expressed the opinion that the milk and cream cans should be cleansed and sterilized at the creamery because of lack of handy facilities at the farm for such operations.

Cream Producers Along Babcock Route.

No.	Name.	Quarts shipped every two days.
1	O. C. Johnson,	
2	T. S. Keeler,	
3	T. S. Tupper,	40
4	W. H. Allen,	
5	Howell Powell,	23
6	O. L. Ellsworth,	60
7	R. F. Diffenbach,	
8	W. Pierce,	
9	Eugene Peet,	27

The following communication was sent by the Commissioner of Health to the Superintendent of the Wyalusing Creamery Company:

"Harrisburg, Sept. 9th, 1910.

"Chas. W. Newman, Supt.,
"Wyalusing Creamery Co.,
"Wyalusing, Pa.

"Dear Sir: In the interest of public health, and as a matter of service to the producers of milk and cream delivered to your establishment, and to promote the interests of your own business, you are requested to cleanse and sterilize all cans and covers in which milk and cream is delivered to your creamery each time such cans are so delivered.

"Furthermore, you are requested to continue permanently the cleansing operations recently established there under the direction of my representative. The strainer through which all milk is passed affords an opportunity for polluting all of one day's shipment from your creamery in the event that through accident or otherwise one man's milk should happen to be polluted. The strainer would in this way become contaminated and hence would be liable to contaminate all of the milk that passed through it that day before the strainer was sterilized. You are requested to have several of such funnel strainers and to use then alternately, sterilizing each strainer before it is again used for the next batch of milk. This is a small matter and yet important.

"The dipper used to stir the cream in the cans is another possible means of contaminating the cans of cream. Several such dippers should be available and you should be careful to have no two cans stirred with the same dipper before sterilizing.

"There should also be several measuring rods and in a similar manner each should be sterilized before dipping into the second mess of milk, and the measuring rods should not be hung up where flies can get at them.

"All flies should be excluded from the creamery by screen doors, etc.

"The employes should be cautioned and instructed not to place their hands inside of the cans or utensils after they have been sterilized.

"Yours truly,
"SAMUEL G. DIXON,
"Commissioner of Health,
"Commonwealth of Pennylvania.'

Samples of water, milk and cream were collected at the creamery. The first water sample was collected from the artesian well at the end of the hose; the second sample of water was collected in the tank suspended from the ceiling; the third sample is that of milk taken from the receiving vat in which there were flies; the fourth sample is of cream from the separator faucet just after the separator was started, and the second sample of cream was taken from the separator faucet at the conclusion of the separation of the cream from the milk. The results are given in the following table and show the milk and cream to be grossly polluted:

Wyalusing Creamery Tests, September 5th, 1910.

Sample No.	Remarks.	Bacteria Per C. C.	
		Total.	B. Coli.
1	Water—artesian well,	2	0
2	Water—in elevator tank,	20	0
3	Milk from receiving vat,	9,720,000	270,000
4	Cream from separator faucet,	20,000,000	5,325,000
5	Cream from separator faucet,	8,100,000	810,000

It is no wonder that dairy products so grossly polluted at the creamery were found unfit for use at Becker's restaurants in Wilkes-Barre.

Wyalusing Creamery Milk and Cream Analyses of Samples Collected at Becker's Restaurants, Wilkes-Barre, Also Tests of Restaurant Ice. September 3rd, 1910.

Sample No.	Remarks.	Bacteria Per C. C.	
		Total.	B. Coli.
	Samples from 32 W. Market St.		
1	Milk. Can in use—half full,	54,000	21,000
2	Cream. Can in use—half full,	3,350,000	216,000
3	Cream. Can in cold storage—unused,	1,350,000	225,000
4	Milk. Can in cold storage—frozen, unused,	200,000	26,200
5	Ice Cream. Can in cold storage—unused,	4,320,000	10,800,000
	Samples from 18 E. Market St.		
6	Milk. Can in use—half full,	840,000	120,000
7	Cream. Can in use—half full,	1,512,000	120,000
8	Ice Cream. Can in use—half full,	1,900,000	90,000

The milk and cream had been shipped from Wyalusing before the Department's agents effected a thorough cleaning and sterilization at the creamery. Mr. Edwin E. Morgan, chairman of Joint Sanitary Committee of Councils, and Dr. S. M. Wolf, City Bacteriologist, were at once notified and they immediately ordered the sale of the ice cream stopped, pending an examination of each can of ice cream in stock. The milk and cream in stock was that shipped in from the creamery since changes were made at the creamery.

Agents were dispatched to Pittston to examine the places where Wyalusing products were utilized.

Mr. L. P. Harter, 32 N. Main street, Pittston, conducts a restaurant and bakery business. He is a wholesale and retail ice cream manufacturer and ships ice cream to the neighboring municipalities, and also supplies picnics. He also purchases milk and cream from the Bradford Creamery Company at Laceyville, Bradford County, Pa. The empty milk cans were unwashed and dirty. Orders for their cleansing and sterilizing were given and followed up.

Mr. J. J. Boyle, proprietor, Wyoming Hotel, Pittston, receives one 40 quart can of milk every other day from Wyalusing. The cans are not washed before returning.

Mr. J. J. McHale, conducts a restaurant on Main street, Pittston. The empty cans are not washed before they are returned to the creamery.

Mr. Michael Cossman operates a milk depot and creamery in an alley off of Charles Street, Pittston. He vends milk on two milk routes and sells approximately 50 quarts daily. He also obtains two cans of milk from the Wyalusing Creamery every other day. The cans are not washed before they are returned to Wyalusing. He has a steam sterilizing plant on the property but does not use it.

The mayor and the Board of Health were notified by the Commissioner of Health that attention should be given to the manner in which milk and cream is received and handled at restaurants, eating places, houses and elsewhere in Pittston.

MINOR SOURCES.—On completion of the Department's canvass of all Pennsylvania sources of milk supply to Wilkes-Barre during the summer of 1910, it was found that the milk was produced at 362 farms, thence collected at 34 places, and from thence brought into the city. Two hundred and sixteen of these farms supply milk and cream to the nine creameries hereinbefore described, leaving 146 farms from which milk is supplied directly to the city only. Some of the producers furnishing the said creameries also supply part of their milk directly to the city. In the following table of location of the farms and the places of shipment by counties, the post office address of the producer governs:

State Department of Health Canvass of Pennsylvania Producers of Milk and Cream Supplied to Wilkes-Barre During Summer of 1910.

County.	Places of collection and shipment.	Number of farms on which product is produced.
Luzerne,	9	39
Wyoming,	14	167
Bradford,	9	152
Susquehanna,	1	3
Columbia,	1	1

Dr. J. H. Timberman, a veterinary physician of Wilkes-Barre, appointed by the State Live Stock and Sanitary Board to make an inspection of the dairies supplying milk to the city, called at the Wilkes-Barre headquarters on September 8th to ascertain what the Department was doing and to obtain a list of all creameries and farms furnishing the Wilkes-Barre supply. Correct data were given to him as fast as they came in from the field. The State Department's work was conducted with respect to the health of those producing and handling the milk and to the establishment of such conditions as would tend to shut off the avenues of typhoid infection to the city. Dr. Timberman prosecuted his work along broader lines, taking into account the state of health of the cattle, besides other things customary in the regular duties of dairy farm inspection.

e. Relation of General Milk Supply to Typhoid in City.
(Exclusive of Rineman and Thoma Milk.)

In this section of the report the relation of the remaining reported 91 typhoid fever cases to the general milk supply, excluding, of course Rineman and Thoma milk, is discussed.

The said 91 reported typhoid cases among which there are duplicates, occurred among the customers of 42 city dealers. Among 10 principal dealers having a total of 2,973 customers, there was a total of 63 reported cases of typhoid fever. Five of these dealers had sub-dealers. Their names are given on the following table:

Ten Principal Dealers.

	Dealer.	Number of—		Remarks.
		Retail customers	Typhoid cases.	
1	Farmers' Dairy Co.,	778	13	
	Sub-Dealers.			
	J. H. Collacott,	100 est.	1	Milk from Farmers' Dairy only.
	John Nagle,	100 est.	1	Milk from Farmers' Dairy only.
	Chas. M. Rau,	21	1	Milk from Farmers' Dairy only.
	Mrs. S. A. Stoltz,	40	3	Milk from Farmers' Dairy only.
	Totals,	1,039	19	
2	Standard Dairy,	661	6	
	Sub-Dealers.			
	John Alles,	101	3	Milk from three sources.
	John Goss,	100 est	1	Milk from Standard only.
	Mitchell & Co.,	100 est.	2	Milk from Standard only.
	Totals,	962	12	
3	Richard Clink,	55	4	
	Sub-Dealer.			
	Mrs McGinty,	20	2	Milk from Clink only.
	Totals,	75	6	
4	George Newcomb,	128	5	
5	Mrs. Goodstein,	25	4	
6	Millside Dairy,	201	4	
7	Chas. Kresge,	150 est.	4	
8	Wm. H. Snyder,	105	2	
	Sub-Dealer.			
	Harry Johnson,	18	1	Milk from Snyder only.
	Totals,	123	3	
9	J. F. Loomis,	100 est.	1	
	Sub-Dealer.			
	A. L. Young,	20	2	Milk from Loomis only.
	Totals,	120	3	
10	J. F. Schmoll,	150 est.	3	
	Grand totals,	2,973	63	

FARMERS' DAIRY COMPANY.—The Farmers' Dairy Company deal wholesale and retail, in dairy products at 412 South Main street and 37 North Main street, Wilkes-Barre. Milk and cream are obtained from the creameries heretofore described. Mr. G. M. Carpenter, the manager, owns and operates a farm in Dorranceton. When told by the Department that three out of four samples of milk collected at hotel and restaurants on September 8th and furnished from his store showed gross contamination, he attributed this to the creameries. He was told that the Department would proceed with investigations on the assumption that the milk was polluted at the farms. Inspections would be made there and also of the method of receiving and handling milk at the creameries. Lack of care in handling the milk at restaurants and hotels would be investigated. He was requested to exercise extreme vigilance in thoroughly cleansing and sterilizing the cans and utensils at his stores, farm and creameries.

The company wholesales milk and cream to 25 dealers in Wilkes-Barre and retails to 778 customers. Four of the sub-dealers, using Farmers' Dairy milk only, had a total of six cases of typhoid fever, among their customers, and with 13 cases receiving milk from the company venders along the several routes, makes a total of 19 cases to investigate in connection with the Farmers' Dairy Company distribution. No typhoid fever was discovered at the creameries or sources of supply to the Farmers' Dairy Company. In the following table data are given relative to these 19 cases:

Typhoid Fever Cases among Farmers' Dairy Customers, 1910.

Date of onset.		Patient.	Age.	No. in family.	Employment.
		Farmers' Dairy Direct.			
July	4	Mrs Peter F. Andes, 29 Abbott St.,	52	5	Wife.
	13	Mary Loftus, 29 E. Northampton,	33	3	Milliner.
	7	Mary Levison, 20 Garnet Lane,	16	6	Cash girl
	24	Alfred Johnson, 83 N. River,	10	12	At home.
	25	Mrs. Sam Swick, 8 Anhauser Lane,	40	3	Wife.
	31	Beatrice Simmons, 20 Regent St.,	10	3	At home.
Aug.	3	Bernhard Dressel, 435 Scott St.,	25	6	Conductor
	13	Mrs. S. Cady, 280 E. Northampton,	41	8	Housekeeper.
	18	Chas. D. Meckin, 311 Madison,	32	5	Taxicab.
	15	Katharine Hanks, 45 Chester,	4	7	At home.
	23	Evan Challis, 376 E. Market,	35	6	Barber.
Sept.	4	Dr. A. J Caffery, Mercy Hospital,	26	0	Res. physician.
Aug.	15	Chas. Fornwald, Old Fell Hotel,	50	0	Bartender
		James H. Collacott, Sub-Dealer.			
Aug.	28	Mrs. Lawrence Grover, 863 High St.,	23	4	At home.
		John Nagle, Sub-Dealer.			
Aug.	14	Anna Austin, 210 Stanton,	18	12	At home.
		Charles M. Rau, Sub-Dealer.			
Sept.	5	Harry Hauser, 209 McLean,	18	6	Laborer.
		Mr. S. A Stoltz, Sub-Dealer			
Aug.	3	Mrs. Ella Snipas, 49 Harkins Lane,	34		Wife.
	26	Eliza Kratz, 47 Jones St.,	17	9	At home.
	10	Eliza Ferry, 105 Jones St.,	7	7	Factory.

The cases of Andes, Loftus, Levison, Dressel, Hanks, Austin and Ferry have been previously discussed and ascribed to their various causes. This leaves 12 cases of the above table to be discussed.

Alfred Johnson was visiting with his mother in the family of Derr, having come from Brooklyn, June 15th. He ate ice cream freely at Beckers. He was the only one of a family of 12 who contracted the disease. He was not known to have played with typhoid suspects. After a thorough investigation the origin of the case remain obscure. The family thought it might have been ice cream. Mrs. Swick's case revealed no suspicious cause upon a thorough investigation. The origin remain obscure. Beatrice Simmons attended a picnic at the Garney estate at Trucksville 11 days before her onset. Elizabeth Garney, who was there, contracted typhoid August 10th. They were members of the same Sunday School class. The origin of Beatrice's case is considered obscure. Mrs. Cady was housekeeper at the home of her sister, Mrs. G. W. Gwillan. She came from Youngstown, Ohio, two weeks previous to her onset. Two cases of typhoid fever subsequently developed in the Youngstown family.

Her case is classed as important. Charles Meekin drives a taxicab from Madison street. He drank water and took his lunches all about the city. He also partook freely of fruit. He was related to Mary Gilligan, but had not seen her for six months. On August 4th he was at Harvey's Lake. The origin of the case was obscure. Evan Challis is a barber and a member of the city council. At his home pasteurized milk was used. He is proprietor of the Blue Rock Water Company, engaged in bottling and distributing spring water to consumers in Wilkes-Barre. He had nothing to do with the actual operation. The origin of his case is obscure. Dr. Caffrey was resident physician at Mercy Hospital. He made pathological examination in the laboratory and was working with typhoid organisms. His case is ascribed to secondary infection of this origin. Charles Fornwald roomed at the old Fell Hotel. He was employed as bartender at the Hinckley House covering a period of three weeks before his admission to the hospital, September 8th. During this time he was sick and on the day of admission to the hospital he walked there, although in a delirious condition, so it is reported. He had been far from well all summer. Most of his meals were taken at lunch wagons. He was thought to have been a case of walking typhoid. At the hospital he was considered a doubtful case after he had been there one week. He could have been the means of spreading the disease through those coming in contact with him, or the things he handled. Prior to the middle of August, for three months he had attended the bar at Dersheimer's saloon on South Main street. Very few of the typhoid patients canvassed by the Department during the summer were found to have frequented saloons. The origin of Fornwald's case is obscure. Mrs. Grover felt ill and went to bed on August 28th, with what was thought to have been nervous prostration. On September 6th, the case was diagnosed as typhoid fever and she was admitted to the hospital on the next day. She drank water from the Thoma well that was condemned by the Department. The origin of the case remains obscure. Harry Hauser frequently went swimming in the sewage polluted river and to this cause his case is attributed. He was the only afflicted one in a family of six. Eva Snipas did the work at home where she was content to remain, going out infrequently. She had partaken of Stoltlz's milk, but did not eat fruit or ice cream, and only suspicious circumstances revealed by investigation was, that on July 2d, 7 days before her onset, she attended a picnic at Harvey's Lake. The case is considered of obscure origin. Eliza Kratz had been unwell all summer but she was still employed at the Rafkin Overall Factory up to the day of her onset, August 26th. She had made no visits, did not run about town, and had no acquaintances among typhoid patients. The suspicious fact concerning her case is that on August 14th, 12 days before she was stricken with typhoid fever, she drank freely of Vulcan spring water. To this cause her case is ascribed (see section of report on spring water.)

Thus it appears that 8 of the 12 cases under discussion were of obscure origin, one was imported, one secondary, one was attributed to bathing in the river and the other to Vulcan Spring.

STANDARD DAIRY COMPANY.—The Standard Dairy Company does a wholesale and retail business at 181 North Pennsylvania avenue, receiving its supply direct from 22 farms, 9 being at Dallas, 10 at Centre Moreland, 2 at Mehoppany and 1 at Laceyville. The company retails to 661 customers—and additional customers through 3 sub-dealers, making a grand total of 962. Among these customers there were 12 cases of typhoid fever. The sources of supply were investigated and found to be free from suspicion of typhoid infection. In the following table data are given relative to these 12 cases:

Typhoid Fever Cases Among Standard Dairy Customers—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
	Standard Dairy Direct.			
Aug. 1	Mrs. Ann Bedford, 115 Dana St.,	72	3	At home.
4	Mrs. Minnie Vamohy, 9 W. Elm St.,	29	3	At home.
10	Ruth Schlom, 149 S. Welles St.,	7	5	At home.
11	Ethyl Schlom, 149 S. Welles St.,	8	5	At home.
23	Evan Challis, 376 E. Market St.,	35	6	Barber.
Sept. 4	Mrs. Fred. Marsh, 734 S. Main St.,	24	5	At home.
	John Alles, Sub-Dealer.			
Aug. 1	Mike Damico, 193 S. Penna. Ave.,	14	6	Barber.
15	Rosa Becker, 246 N. Washington,	14	7	School.
Sept. 24	Mrs. Wm. Payne, 258 S. State St.,	38	3	At home.
	Mitchell & Company, Sub-Dealers.			
July 24	Philip Umbewust, 72 Hazle St.,	48	3	Saloonkeeper.
31	Mike Umbewust, 72 Hazle St.,	42	3	Fireman.
	John Goss, Sub-Dealer.			
July 29	Alfred Bossert, 67 N. Main St.,	13	4	At home.

The cases of Bossert, Becker, Challis, two Schloms and the two Umbewust have been previously discussed and ascribed to their various causes, leaving five of the above cases to be examined.

Anna Bedford died August 17th. No satisfactory cause for the disease could be found. The origin is classed as obscure.

Mrs. Vamohy was removed to the hospital and the house closed. Neighbors supplied the information that she stayed home all the time, had no visitors and used Standard Dairy milk only The cause of the disease is unknown.

Mrs. Marsh's case was secondary to that of her husband. (See discussion of the Secondary Infection.)

Mike Damico was employed in the barber shop on Northampton street from early until late. He spent his evenings at home reading and there was no suspicious cause for the sickness. His mother kept a small store on the premises where fruit and vegetables and groceries were sold. She nursed Mike during his first week's illness while attending store. The Department failed to trace any infection by this means. The case is classed as unknown origin. Mrs. Payne's case remains obscure.

Thus it appears that of the five cases examined of the 12 listed, one was secondary origin and four must be classed as of obscure origin.

RICHARD CLINK, DEALER. Richard Clink conducts his business at 296 South River street. He retails to 55 consumers among whom there were four typhoid fever cases and two additional ones among Mrs. McGinty's customers. Mrs. McGinty purchased milk from Clink. Mr. Clink purchased his supply from F. Ball and J. Wagner of La Grange and occasionally from the Standard Dairy. These sources were found free of suspicion of typhoid infection. In the following table data are given relative to the 6 cases:

Typhoid Fever Cases Among Richard Clink's Customers—1910

Date of onset.	Patient.	Age.	No. in family.	Employment.
	Richard Clink Direct.			
Aug. 10	Cyrus Hunsinger, 212 S. Main St.,	16	5	Errand boy.
18	May Hibbard, 29 E. Jackson St.,	20	5	Milliner.
20	Arthur Rhoads, 27 Catherine St.,	29	2	Salesman.
19	Eliza Pierce, 51 Wright St.,	14	4	At home.
	Mrs. McGinty, Sub-Dealer.			
July 17	Morris McMennigle, 375 Scott St.,	21	4	Laborer.
Aug. 12	Anastasia Demura, 9 Metcalf St.,	2	7	At home.

The cases of Pierce, Rhoads and McMennigle have been previously discussed and ascribed to their causes, leaving three of the above cases to be examined.

Cyrus Hunsinger as messenger boy for the Keystone Dyeing Company, ran errands all over town, ate and drank anything wherever he might be. Dr. Hughes, the attending physician and the Department could find no satisfactory cause for the infection. The case is classed as obscure. May Hibbard was employed as milliner at Coons Store. She had been under the doctor's care since July 11th for rheumatism. She ate fruit and ice cream down town. Had paid no visits anywhere and took her meals at home. The family used Clink and Snyder milk and vegetables from hucksters. The case was diagnosed as typhoid by the attending physician on August 18th. The origin is classed as obscure.

Anastasia Demura's case was finally decided by the attending physicians confirmed by Dr. Miner as not being typhoid. The premises were in a filthy condition and had to be cleaned up and disinfected by the city health department. A negative Widal test was made.

Thus it appears that of the three cases examined of the six listed, one was not typhoid and two were of obscure origin.

GEORGE NEWCOMB, DEALER. George Newcomb conducts his business at 133 Parrish street. He retails to 128 customers among whom there were five typhoid fever cases. He purchased his supply from farmers at Mehoppany Falls and Lackawanna. There sources were found free of suspicion of typhoid infection. In the following table data are given relative to the five cases:

Typhoid Fever Cases Among George Newcomb's Customers, 1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
July 14	Helen Franks, 454 S. Main St.,	18	5	At home.
27	Robert Gilligan, 613 Hazle St.,	5	6	At home.
30	Mary Gilligan, 249 Blackman St.,	37	4	Saleswoman.
Aug. 1	Margaret Gilligan, 613 Hazle St.,	8	6	At home.
14	Anna Austin, 210 Stanton St.,	18	12	At home.

The cases of the Gilligans and that of Anna Austin have been previously discussed and ascribed to their causes.

Helen Franks worked at home in the house of her step-father, G. H. Groff. She had no typhoid acquaintances and there was no suspicious cause of her infection, save, possibly, her attendance at a picnic at Fern Brook two weeks before the onset. Her case is classed as obscure.

MRS. GOODSTEIN, DEALER. Mrs. Goodstein conducts her business at 32 Hancock street. She keeps four cows on the premises and sells the milk from a little store to a number of customers, probably between 20 and 30 in number. Among these there are four typhoid fever cases shown in the following table:

Typhoid Fever Cases Among Mrs. Goodstein's Customers.—1910.

Date of onset.		Patient.	Age.	No. in family.	Employment.
Aug.	1	Carl Adolph, 51 N. Welles St.,	5	8	At home
Sept.	7	Emma Adolph, 51 N. Welles St.,	15	8	At home.
	7	William Adolph, 51 N. Welles St.,	12	8	At home.
	6	Harry Adolph, 51 N. Welles St.,	20	8	Factory.

All of these cases have been previously discussed and ascribed to Thoma milk and secondary infection.

HILLSIDE DAIRY. The Hillside Dairy is located in Jackson township, Luzerne County where blooded stock is kept and the products are sold extensively to special customers among others, totalling in all 201. Among these there were four cases of typhoid fever named in the following table:

Typhoid Fever Cases Among Hillside Dairy Customers—1910.

Date of onset.		Patient.	Age.	No. in family.	Employment.
July	13	Mary Loftus, 29 E. Northampton.	83	3	Milliner.
	24	Alfred Johnson, 83 N. River St.,	10	12	At home.
Aug.	6	Nellie Bonosky, 31 Mallory Place,	21	6	Domestic.
Sept.	12	Mrs. Frank C. Sturgis, 128 W. River St.,	50	5	At home.

The cases of Loftus and Johnson have been previously discussed, leaving two of the above cases to be examined.

Nellie Bonosky was employed in the family of John Hoffa and was the only one to contract typhoid. She seldom used milk, but purchased fruit at a grocery. She was alone in the house from July 23rd to August 15th. On July 27th she had a slight operation on the neck at Mercy Hospital. She returned to the hospital subsequently as a typhoid patient. Her case is classed as of obscure origin. Mrs. Sturgis complained of feeling ill the last part of August. She took to her bed on September 12th, the doctor was called in for the first time on the 19th, and on September 26th he diagnosed the case as typhoid. The family used Glen Summit bottled water. The origin is obscure.

CHARLES KRESGE, DEALER. Mr. Kresge conducts his business from 46 Brown street and retails to about 150 customers. He obtains his supply from the Wyalusing Creamery. Among his customers there were four cases of typhoid fever shown in the following table:

Typhoid Fever Cases Among Chas. Kresge's Customers—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment
Aug. 10	Eliza Ferry, 105 Jones St.,	7	7	At home.
14	Anna Austin, 210 Stanton.	18	12	At home.
26	Eliza Kratz, 47 Jones St.,	17	9	Factory.
Sept. 10	Grace Cunius, 65 Dana St.,	18	10	Factory.

All of these cases but that of Cunius have been previously discussed and ascribed to their several causes of infection.

Grace Cunius worked in the Wilkes-Barre Embroidery Factory. She drank milk occasionally at Powell's store. She and her sister went to Nuangola Lake resort for Sunday, August 28th, just two weeks before her onset. She was the only one of a family of ten to contract typhoid. Her case is classed as obscure in origin.

WILLIAM H. SNYDER, DEALER. Mr. Snyder conducts his business from 80 South Hancock street. His supply comes from Allen of Montrose, Susquehanna County and Davies of Scottville, Wyoming County, inspected and found satisfactory so far as suspicion of typhoid infection is concerned. Mr. Snyder supplies 105 customers direct and 18 through sub-dealer Johnson. Among these 123 consumers there were three cases of typhoid fever shown in the following table:

Typhoid Fever Cases Among W. H. Snyder's Customers—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
	W. H. Snyder, Direct.			
Aug. 23	Evan Challis, 376 E. Market St.,	35	6	Barber.
18	May Hibbard, 29 E. Jackson St.,	20	5	Milliner.
	Harry Johnson, Sub-Dealer.			
Aug. 18	May Hibbard, 29 E. Jackson St.,	20	5	Milliner.

All of these cases have been previously discussed and ascribed to their origin of infection.

J. B. LOOMIS, DEALER. Mr. Loomis conducts his business from 126 Academy street. The supply comes from the Standard Butter Company and from farmers at Milan and White's Ferry and was free from suspicion of typhoid infection. Mr. Loomis supplies about 100 customers direct and 20 additional customers through sub-dealer Young. Among the total of 120 customers there were three cases of typhoid fever named in the following table:

Typhoid Fever Cases Among J. B. Loomis' Customers—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
Aug. 15	Chas. Fornwald, Old Fell Hotel,	50	0	Bartender.
July 24	Philip Umbewust, 72 Hazle St.,	48	8	Saloonkeeper.
31	Mike Umbewust, 72 Hazle St.,	42	3	Fireman.

All of these cases had been previously discussed and ascribed to their several causes of infection.

J. F. SCHMOLL, DEALER. Mr. Schmoll conducts his business from his farm at Forty Fort. He conducts a dairy of 23 cows and obtains some milk from William Prime of the same place. Among his customers in Wilkes-Barre there were three cases of typhoid fever named in the following table:

Typhoid Fever Cases Among J. F. Schmoll's Customers—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
July 24	Philip Umbewust, 72 Hazle St.,	48	8	Saloonkeeper.
Aug. 10	Eliza Garney, 52 Walnut St.,	15	5	At home.
Sept. 15	Joseph Miller, 7 Orchard St.,	18	3	Orderly.

The Umbewust case has been previously discussed.

Eliza Garney had spent the summer at the family's cottage at Trucksville. When Eliza was taken sick August 10th, the family came home to Wilkes-Barre where they secured milk from Schmoll. While at the cottage, spring water was obtained from neighbor Youngblood. This spring was used by several families. The cottage milk supply was from Schooley farm delivered by Harter. The patient had visited at Harvey's Lake about two weeks before her onset. Her Sunday School classmate, Beatrice Simmons, who was stricken July 31st, attended a picnic at the Garney cottage July 20th. The Garney case might be attributed to infection at Harvey's Lake. It is classed as obscure. Joseph Miller was employed at the Retreat Poor Farm and Hospital in the capacity of an orderly, until August 31st, when he came to Wilkes-Barre and lived alone in his brother's house. He prepared his own meals there for a few days. He took a trip to New York City about two weeks before his onset. The origin of his case must remain obscure.

Summary of Typhoid Fever Cases Among the Customers of the Ten Principal Dealers, Excluding Rineman and Thoma Milk Cases—1910.

Total cases.	Previously classified under Rineman and Thoma.	Canvassed under ten principal dealers.	Classification of the 26 cases not previously classified.						
			Obscure or unknown.	Imported.	Secondary	River bathing.	Vulcan spring.	Not typhoid.	Total
63	37	26	20	1	2	1	1	1	26

Among the remaining 22 miscellaneous dealers there was a total of 28 reported cases of typhoid fever distributed among a total of 1,718 customers. Six of these miscellaneous dealers had two cases each among their customers and the remaining 16 had one case each among their consumers. Data relative to the number of customers are given in the following table:

Twenty-Two Miscellaneous Dealers.

Dealers.	Number of— Customers	Number of— Typhoid cases	Remarks.
Mary Evans,	24	2	One case to each dealer
H. J. Harter,	300 est.	2	
Jersey Queen Dairy,	127	2	
Chas. Kern,	261	2	
W. H. Powell,	50 est.	2	
W. A. Wallace,	4	2	
Miscellaneous,	952 est	16	
Grand total,	1,718	28	

MARY EVANS, DEALER.—Mary Evans keeps 3 cows on her property at 233 South Sherman street and vends the supply. All of the milk utensils were sterilized under the superintendency of a Department inspector.

H. J. HARTER, DEALER.—Mr. Harter does not produce milk. He drives two milk wagons and delivers milk to customers in Kingston and vicinity and in Wilkes-Barre. He receives milk from the Schooley farm and from Anderson, Sutton and McCarren of Trucksville and E. L. Sox of Wyoming. The milk delivered in Kingston is obtained from William Bulford. In the following table milk and water analyses at farms producing the Harter supply are given:

Milk and Water Analyses at Farms Producing Supply Delivered by H. J. Harter—1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total	B. Coli.
Sept. 5	Milk—Wm. Bulford farm,	1,000,000	0
5	Milk—Z. F. Schooley farm,	6,480,000	26,750
5	Milk—F. G. Anderson farm,	150,000	33,125
5	Milk—W. S. Hutton farm,	250,000	0
12	Milk—Z. F. Schooley farm,	102,200	150
12	Milk—F. G. Anderson farm,	6,800	0
12	Water—Z. F. Schooley farm,	16	0
12	Water—F. G. Anderson farm,	30,000	300

Department inspectors superintended the cleaning and sterilization of utensils and manner of handling the milk at these places between September 5th and September 12th, as the results show in the analyses. Mr. Anderson was given instruction about protecting the water supply at his farm. Mr. Harter's cans and milk utensils were also cleansed and sterilized by the Department inspectors as an example of how he should do the work.

JERSEY QUEEN DAIRY.—Jersey Queen Dairy is a large farm at Mifflinville, Columbia County. Registered Jersey cattle only are kept at the farm. The company maintains an office at Wilkes-Barre and supplies 127 customers regularly. No criticism was made of the manner in which the milk was produced and handled at Mifflinville. There was no suspicion of the milk being typhoid infected.

CHARLES KERN, DEALER. Mr. Kern operates from 74 East Jackson street. He produces his own milk at two farms at Alderson, tenanted by Howard Strohl and H. Robert.

W. H. POWELL, DEALER.—Mr. Powell operates from 2 Lehigh street. The milk comes from Waymart Creamery, Wayne County. His customers are estimated at 50.

W. A. WALLACE, DEALER.—Mr. Wallace resides on South Main street. He keeps a cow out in the township. Mr. Monahan attends to the milking and brings the product into town. The Department's inspector ascertained that milk was being furnished to four customers only, namely: James Fritz, Peter Malcomer and Peiffer, besides the two typhoid victims in the R. H. Wallace family.

In the following table data concerning the 12 typhoid fever cases among six miscellaneous dealers are given:

Typhoid Fever Cases Among Customer of Six Miscellaneous Dealers—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
1910.	Mary Evans, Dealer.			
Aug. 13	Barbara Cartner, 249 S. Hancock St.,	47	8	At home.
11	Eliza Weldeman, 70 Hazle Ave.,	18	5	At home.
	H. J. Harter, Dealer.			
July 1	Cecelia Haddock, 132 Park Ave.,	18	10	At home.
Aug. 10	Eliza Garney, 32 Walnut St.,	15	5	At home.
	Jersey Queen Dairy.			
Aug. 2	Harry Baur, 328 E. South St.,	21	7	Vulcan Iron.
4	Anna Flynn, 304 Scott St.,	22	4	Bookkeeper.

Date of onset.	Patient.	Age.	No. in family.	Employment.
	Charles Kern, Dealer.			
July 15	Mrs. Wm. A. Mellick, 231 N. Main St.,	35	2	At home.
Aug. 15	Mrs. Jos Gawlas, 119 Wyoming St.,	22	7	At home.
	Wm. H. Powell, Dealer.			
Aug. 12	Anastasia Demura, 9 Metcalf St.,	2	7	At home.
14	Frank P. Schuler, 118 Hazle St.,	25	10	Vulcan iron.
	W. A. Wallace, Dealer.			
July 4	Mrs. R. H. Wallace, 94 Academy St.,	26	3	At home.
July 5	Margaret Wallace, 94 Academy St.,	1	3	At home.

The cases of Weidman, Haddock, Carney, Flynn, Mellick, Demura and Schuler have been perviously discussed and ascribed to their causes, leaving 5 of the above case to be examined. Cecilia Haddock's case origin is obscure. It, and her brother Samuel's case are discussed under Rineman. They were taken sick on the Haddock farm adjoining the Rineman's farm and were then imported to Wilkes-Barre (see discussion under imported cases.)

Garbara Gartner did the work at home. She was taken sick July 28th, was reported as having her onset August 13th but did not go to bed until August 18th. Her disease was considered to be of the ambulatory form. She was one of a family of eight. None of the others had the disease. The milk supply was not suspected. The origin of the case was unknown. Harry Baur was employed at the Vulcan Iron Works. He bathed in the sewage polluted river frequently and to this fact the origin of his case is attributed, there being no other suspected cause. Mrs. Gawlas had no typhoid fever acquaintances. She went to Buffalo July 30th for two days and returned home feeling miserable. Did not go to bed until August 19th and was admitted to the hospital 5 days days later when the case was pronounced typhoid. She had visited around some the first part of August. The Department followed these visits up carefully but could discover the occurrence of typhoid fever at none of the places visited by Mrs. Gawlas. The origin of the case is unknown since the milk supply was not suspected. Furthermore, the patient did not drink milk. Margaret Wallace's case was an imported one (see discussion of imported typhoid fever.) Mrs. R. H. Wallace nursed Margaret, fondling and kissing her and in this way contracted the contagion. Her case is classed as secondary (see discussion under secondary infection.)

In the following table are given data relative to the typhoid fever cases among the customers of the 16 remaining miscellaneous dealers:

Typhoid Fever Cases Among Customers of Sixteen Miscellaneous Dealers.—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
1910.	Dealer Altemose.			
Aug. 16	Rose Neer, 60 Oak St.,	18	5	Milliner.
	Dealer Collett.			
Aug. 13	Wm. S. Astrowski, 286 Moyallen St.,	31	4	Miner.
	Dealer Collins.			
Sept. 6	Anna Loeflad, 35 Alexander St.,	8	8	At home.
	Dealer Crawley.			
Aug. 31	Chas. F. McLaughlin, 18 Maxwell St.,	38	8	Health officer.

Typhoid Fever Cases Among Customers of Sixteen Miscellaneous Dealers.—1910.
—Continued.

Date of onset.	Patient.	Age.	No. in family.	Employment.
July 7	Dealer Czrebonowski. Albin Sholinsky, 63 Logan St.,	14	7	Bowling alley.
Sept. 24	Dealer. Cut Rate Grocery. Maggie Payne, 253 S. State St.,	38	-------	At home.
July 30	Dealer Hallauer. Jos. Ashberger, 67 N. Main St.,	21	9	Bartender.
Aug. 7	Dealer Klein. Jos. Zeigler, 65 N. Sherman St.,	2	5	At home.
Aug. 20	Dealer Lewis. Fannie Hayden, 121 Carlisle St.,	7	3	At home.
Aug. 16	Dealer McNellis. Amelia Schornstein, 517 N. Penna. Ave.,	15	7	At home
Sept. 18	Dealer Miller, H. F. Sam Williams, 124 Parrish St.,	5	5	At home.
Aug. 23	Dealer O'Hara. Gertrude Edwards, 377 N. Washington St.,	18	9	At home.
Aug. 22	Dealer Pearson. Mrs. Rosie Kozenchak, 692 N. Washington St.,	26	8	At home.
July 23	Dealer Snook. John Maloney, 561 N. Main St.,	31	4	Laborer.
June 20	Dealer Waters. Edward Rehill, 341 Scott St.,	26	3	Motorman.
Aug. 23	Dealer Winterstein. Gertrude Edwards, 377 N. Washington St.,	18	9	At home.

The cases of Payne, Ashberger, Hayden, Schornstein and Rehill have been previously discussed and ascribed to their various causes, leaving 11 of the above cases to be examined.

Rose Neer was employed at Mendricks' Millinery Store part of the time. She went about town every evening. She frequently went away for a week at a time. She was at Harvey's Lake July 24th. She drank no milk. The family was supplied by Altemose. This dealer lived at 39 Willow street and kept 7 cows there, supplying 44 families. The origin of Miss Neer's case is classed as unknown.

William Astrowski was employed at No. 3 mine, South Wilkes-Barre. Little of a satisfactory nature could be learned about him. He had no typhoid acquaintances and did not consider that he had typhoid. The doctor paid one visit only and reported the case as ambulatory in form. A negative blood test was made. The case is considered as not typhoid.

Dealer Collett got his milk from farmers at Lackawanna and supplied possibly 60 customers.

Anna Loeflad nursed her aunt who had typhoid fever at Mauch Chunk. This was between August 7th and 21st. Anna returned to Wilkes-Barre and was stricken September 6th. There is no other suspicious circumstance connected with her case. It is classed as imported. Her family got Collins milk. This dealer bought out the Rineman business. The milk was not suspected at this time.

McLaughlin was a city health officer. He was engaged in placarding and disinfecting typhoid fever premises for the city Board of Health. He was the only one of a family of eight to contract the diseases. The case is classed as of secondary origin.

Dealer Crawley supplied the milk to the McLaughlin family. The supply was not suspected. It came from the Standard Butter Company. Crawley had 94 customers.

Albin Scholinsky was employed in a Bowling Alley. He bathed daily in the sewage polluted river and to this cause his case is attributed. (See discussion under Boating, Bathing and Washing in River.) The family was supplied with milk by Czrebonowski, produced by Paluch. The latter man kept cows on his property. His place was inspected and the dairy utensils were thoroughly cleansed and sterilized under the superintendency of a Department inspector. Czrebonowski furnished 20 families with mik.

Joseph Zeigler was the only one in a family of five to contract typhoid. His uncle, Mr. Klein, kept two cows on Hayes Lane and supplied the Zeigler family, and six other families. The Klein place was inspected and cleaned up and all milk utensils were sterilized by a Department inspector. The Zeigler case after thorough investigation, was classed as of unknown origin.

Sam. Williams was the only one of a family of five to have typhoid. He had no typhoid acquaintances and the children did not play out of the yard. The family used Vulcan Spring water for drinking purposes and occasionally from Thoma's well This case is ascribed to Vulcan Spring. The family milk was furnished by H. F. Miller who has 114 customers. Had his milk been infected more than one case of typhoid fever among at least 500 individuals represented by the 114 customers would have been recorded.

Gertrude Edwards' case is attributed to frequent boating on the river and trailing her hands in the sewage polluted waters. This was the suspicious thing about her case. (See part of report dealing with river.) She was the only one of a party of nine to contract typhoid fever. The family received milk from O'Hara and Winterstein. O'Hara keeps a store at 407 Washington street and supplies about 20 customers. Winterstein keeps a dairy at Bald Mountain; also acquires milk from other farmers and supplies the public at Parsons and Wilkes-Barre, having about 100 customers in the city. The sources were inspected and were found free of suspicion of typhoid infection. At Farmers Kresge's, Miners Mills, cleansing and disinfection was undertaken under the personal sunpervision of the Department's officers.

Mrs. Rosie Kozenchak's case remained obscure as to origin after an extended investigation. Milk dealer Pearson who supplied the family of 8 with milk also furnished 79 other families. His dairy utensils were cleansed and sterilized by Department officers.

John Maloney contracted typhoid from an unknown source. He was employed as a miner by the Hillard Milling Company. He had no typhoid fever acquaintances, except possibly Henry Rabotsky, but there had been no contact between the two. The family obtained milk from Snook, who conducts a dairy in Hanover township and supplies 123 families in Wilkes-Barre.

The summary of the typhoid fever cases among the customers of the 22 miscellaneous dealers are given in the following table:

Summary of Typhoid Fever Cases Among the Customers of the Twenty-two Miscellaneous Dealers—1910.

Total cases	Previously classified under Rineman, Thoma and ten dealers	Canvassed under twenty-two miscellaneous dealers	Classification of the 16 cases not previously classified. Origin.						
			Obscure or unknown.	Imported	Secondary	River bathing, etc.	Vulcan spring.	Not typhoid	Total.
28	13	15	6	2	2	3	1	1	15
Grand Summary, Excluding Rineman and Thoma Milk Cases.									
91	50	41	26	3	4	4	2	2	41

f. Summarized Statement of Milk Infection Cases.

The table first given showing all milk dealers having reported cases of typhoid fever among their customers totaled 189 such cases. The Department's investigation showed 59 of these cases to be duplicates, leaving 130 cases actually occurring. In the following table the classification of the cases are stated:

Summarized Statement of Classification of City Typhoid Cases Investigated in Connection with the Milk Supply.

Origin or Medium of Transmission.		Number of cases attributed.
Rineman milk,		32
Thoma milk,		42
Water:		
Vulcan spring,	4	
Mine water,	1	
		5
Secondary,		5
River bathing, boating and washing,		8
Imported,		3
Obscure or unknown,		33
Not typhoid,		2
Total actual cases,		130
Duplicates,		59
Total cases reported among customers of milk dealers,		189

g. Precautions Taken Relative to Milk Supply.

The public was notified through the newspapers and by means of placards printed for the purpose and attached to poles and proper places along the streets throughout the city to boil the milk and water. Physicians were slow in reporting typhoid fever cases. As soon as a case was reported at the city hall the house was placarded by the city health inspector. The following form of notice was used on yellow cards 15 inches wide and 12 inches high.

Health Dept. City of Wilkes-Barre.

NOTICE!

This House contains a Case of

TYPHOID FEVER

When the Danger of Contagion is passed this card will be removed.
Persons entering herein do so at their own risk.
Penalty for Removal or Defacement of this Card, One Hundred Dollars.

By order of the Sanitary Committee.

Later, when it was found that milkmen were not following out the State regulations regarding the supply of milk to households wherein typhoid fever existed, an additional placard was posted on the property, the following form being used:

Health Dept. City of Wilkes-Barre.

NOTICE TO MILKMEN

This house is under quarantine. The Milkmen must not enter it. The family will set vessels outside, into which the milk or cream is to be poured by the Milkmen, who *must not* handle the vessels. Milk or cream *must not* be delivered in bottles, or tickets received from this house, until this card is removed.

Penalty for violation of this regulation, $5.00 to $100.00.

By order of the Sanitary Committee.

The Sanitary Committee sent out to local dealers and venders the following communication requiring the cleansing of utensils and the furnishing of certain information. A copy of the letter is also given that was sent out to outside dealers supplying milk to the city:

"City of Wilkes-Barre, Pennsylvania,
"Office of the Health Department,
"Wilkes-Barre, Pa., August 15, 1910.

"Dear Sir: The State Health Department of Harrisburg, Pennsylvania, directs that all dealers supplying milk or cream to families or dealers in this city must mail or deliver a complete list of their customers to the Office of the Health Department of this city giving the street number, the average amount of milk supplied to each customer daily, this list must be sent in forthwith.

"Special attention is called to the sterilizing of your bottles, cans and equipments with live steam, where live steam is not used, the equipments must be immersed in scalding water for not less than 20 minutes.

"The surroundings must at all times be kept in a perfect sanitary condition.

"Any dealer failing to comply with this order, after this date will be forbidden to sell any milk or cream in this city.

"By order of the Sanitary Committee."

"City of Wilkes-Barre, Pennsylvania,
"Office of the Health Department,
"Wilkes-Barre, Pa., August 15, 1910.

"Dear Sir: The State Health Department of Harrisburg, Pennsylvania, directs that all dealers supplying milk or cream to dealers of the city of Wilkes-Barre, Pennsylvania or surrounding towns must give special attention to the sterilizing of their cans, bottles and all equipments with live steam, where live steam is not used bottles, cans and equipments must be immersed in scalding water for not less than 20 minutes.

"The surroundings must at all times be kept in a perfect sanitary condition.

"Any dealer failing to comply with this notice, after this date will be forbidden to sell any milk or cream in this city.

"By order of the Sanitary Committee."

On September 12th a second general warning to the public was issued by the Sanitary Committee in response to the following suggestion from the Commissioner of Health:

"September 12, 1912.

"Edwin B. Morgan, Chairman,
Sanitary Committee of Councils,
Wilkes-Barre, Pa.

"Dear Sir: In our prosecution of the work of running down the sources of typhoid infection of Wilkes-Barre and vicinity, in some instances the trail has led to the milk supply. Milk taken from stores, hotels and restaurants has been examined by the Department and found to be polluted in such a number of cases as to warrant the conclusion that a very general contamination of the milk supply to the city exists. The causes are unknown but they are being discovered as rapidly as possible, and remedies are being effected. In the meantime I fear the people of Wilkes-Barre are not following out the injunction to boil the milk, and I wish to suggest that the situation demands a reiterance of the warning to boil the milk as well as the water.

Yours very truly,
SAMUEL G. DIXON,
Commissioner of Health."

The Commissioner of Health's first warning was on August 15th to the public as follows:

"Warning to the public of Wilkes-Barre and Vicinity.

"To proprietors of hotels, restaurants, and eating places, head of families and the general public:

"As a safeguard to your own and the public health boil for twenty minutes all water to be used for drinking and culinary purposes. Also it is safer for the immediate present to boil the milk to be used on your premises.

SAMUEL G. DIXON,
Commissioner of Health."

The sanitary Committee offered $10 reward for information leading to the arrest and conviction of any milk-dealer taking a milk bottle or vessel into or removing it from any dwelling or building where typhoid fever existed in the city of Wilkes-Barre. This committee employed extra assistants in enforcing the city ordinances regulating the production, care and sale of milk and cream, regulating restaurants and other public eating places and defining and regulating bakeries and the sale, delivery and transport of the products thereof.

As the investigation went on it was found that the milk supply of the city was in a general wretchedly bad condition as revealed by examination of milk and cream made by the city bacteriologist, Dr. S. M. Wolfe and by the Department. Much of the unclean milk was attributed to dirty cans. At some of the creameries in the country, complaints were made that it took two or three days of scouring and boiling and steam sterilizing to make the cans clean and free from odor. One or two washings and scourings and steam sterilizing would not answer. At some of the creameries one washing and sterilizing only was done and therefore it was no wonder that the dirty cans shipped back to the city contained unclean and unsuitable food products.

To bring about the proper cleansing of the cans, the city inspectors attempted to see to it that no cans were sent out of the city unless clean. It was found that many of the cans were not even rinsed out in Wilkes-Barre but were returned back to the country farms and creameries. This negligence put the efforts of the creamery man and the farmer to a discount. The sanitary committee found that the dealers in Wilkes-Barre, or some of them, would not voluntarily do the right thing and the city officers were obliged to arrest and bring to justice several offenders. The sanitary committee appointed a special restaurant and dairy inspector and requested that the State Department of Health assist. This was done in some instances.

On September 8th, City and Department officers made an inspection at the Presto Lunch, Academy Lunch, Searfoos Restaurant, Marbell Restaurant and at the Exchange, Hinkle and Poland hotels and collected samples of milk and water. In the following table the results of the analyses are given:

Analyses of Milk, Cream and Water, September 8, 1910.

Sample.	Bacteria Per C. C.	
	Total.	B. Coli.
Poland Hotel, milk from Baldwin,	2,520,000	132,000
Poland Hotel, milk from Baldwin,	630,000	54,000
Poland Hotel, water from Shawnee,	10,800	16
Hinkle Hotel, milk from Farmers' Dairy,	13,000,000	540,000
Hinkle Hotel, water from Pocono,	1,080	0
Academy Lunch, milk from Farmers' Dairy,	1,188,000	0
Water from city supply,	16	0
Presto Lunch, milk from Baldwin,	12,000,000	430,000
Presto Lunch, Cream from Baldwin,	26,000,000	1,620,000
Presto Lunch, water from city supply,	210	0
Exchange Hotel, milk from W. K. Goss,	450,000	8,000
Exchange Hotel, ice cream from Freiler,	4,300,000	135,000
Exchange Hotel, water from Shawnee,	8	0

City and department officers were stationed at the railroad depot to watch the condition of empty cans being shipped back to the country producer. On September 9th at the Lehigh Valley station 5 cans tagged with the name of J. D. Williams, 67 East Market street, restaurant proprietor, were found in filthy condition. He was arrested and taken before the mayor, Honorable M. B. Kniffen, who imposed a fine and costs. The city solicitor prosecuted the case.

On the day following A. Marinus, restaurant proprietor at 35 Public Square, was arrested and fined by Alderman F. D. Brown for attempting to ship filthy empty cans to Charles Keeney of Black Walnut. The condition of these cans can hardly be imagined. Thick wads of accumulated mould adhered to the inside walls and bottom of the cans. The same day in the evening 5 cans belonging to the Farmers' Dairy were intercepted at the station and returned for cleaning and sterilization. The manager was brought before the alderman and on his promise to carry out the instructions of the city officers, sentence was suspended.

William H. Powell who keeps a store at 2 Lehigh street was arrested on September 12th for attempting to ship filthy cans to the Waymart creamery in Wayne County. He was fined under section 16 of the city ordinance.

On September 12th samples of milk and cream in cans at the home of W. M. Baldwin of 153 Union street, Dorranceton, were collected. This dealer supplies milk and cream to the Stirling Hotel, among other places. One of the samples was from a can in the kitchen of the hotel. It showed contamination. The results of these examinations are given in the following table:

Analyses of Baldwin Milk and Cream, September 12, 1910.

Sample.	Bacteria Per C. C.	
	Total.	B. Coli.
Milk from Allen, producer,	3,240,000	13,500
Milk from Goodman, producer,	120,000	0
Milk from Martin, producer,	1,800,000	42,000
Milk from Hawthorn, producer,	8,100,000	6,500,000
Cream, pasteurized, from Centre Moreland,	3,500	0
Milk, Hotel Stirling, from Baldwin,	1,600,000	21,000

Investigations were at once started at the Baldwin home and at the sources of supply of Baldwin's milk. Mr. Baldwin is a dealer only, does not keep cows and did not wash or clean cans. His place is simply a transfer station. The farmers from the country bring filled cans to Baldwin's place and carry back their empty cans. Mr. Baldwin has wagons engaged in transporting the milk and cream deposited at his house to the city of Wilkes-Barre and other places. He owns a controlling interest in the Centre Moreland Creamery, which is described elsewhere in this report. Besides the products from this creamery, Mr. Baldwin receives cream from M. S. Allan of Montrose and H. G. Hawthorne of Monroeton. He obtains milk direct from Goodman, Bigelow and Kunkle of Alderson and from Fisher, James and William Race, Elston, Hess, Isaac, Martin of Kunkle and Sam and George Montrass of Ceminola.

He delivers milk in wholesale quantities to dealers, Harter of Hillside and Anderson and Rydan of Dorranceton, and milk and cream to the Presto Lunch and the Stirling Hotel, Wilkes-Barre. He also supplies cream as ordered to Papus and Dwyer of Plymouth, to James Case, confectioner of Kingston, and to Sardoni, ice cream manufacturer of Forty Fort and to Baum and Son of Ashley.

Department inspectors went to the place of production and made a sanitary investigation, corrected faults that were apparent and collected samples where advisable. In the following table the results are given:

Samples of Milk and Cream Handled by Baldwin—1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Sept. 14	Goodman milk, at farm,	120,000	0
14	Biglow milk, at farm,	90,000	0
14	Kunkel milk, at spring house,	14,000	0
14	Isaac milk, at farm,	7,000	250
14	Fisher milk, at farm,	21,000	100
14	Elston milk, at farm,	14,000	0
14	Martin milk, at farm,	7,000	100
14	Jas. Race milk, at farm,	14,000	0
15	Geo. Montrass milk, at farm,	170	25
15	Sam. Montrass milk, at farm,	970,000	0
15	Cream from Centre Moreland Creamery, pasteurized,	1,200	0

The above samples were collected after the Department inspectors had seen to it that Mr. Baldwin thoroughly cleansed and sterilized the empty cans at his depot. There was a boiler and equipment previously installed there, but he had neglected to use it.

On September 16th Jos. Rosenn, a dealer living in the suburbs of Wilkes-Barre had returned to him for cleaning and sterilization, three cans intercepted at the station of the Lehigh Valley. Geo. Albeck of 37 So. Sherman Street had returned to him for cleaning and sterilizing one case of 48 filthy bottles addressed to the Jersey Cream & Stock Farm. The Farmers Dairy had a wagon load of filthy cans intercepted at the Lehigh Valley Station. These three dealers were arrested and fined.

It was necessary to pursue this course in order to impress upon the dealers the fact that the health authorities meant business in their attempt to suppress the epidemic of typhoid fever and that all orders and regulations must be obeyed The empty cans if not sterile, might carry typhoid infection back into the country and from there return in the milk and cream to a large number of people.

2. Miscellaneous Infection.

As hereinbefore stated, the Department's canvas of city typhoid fever case thus far has been shown 33 cases to have been of obscure or unknown origin. Perhaps all of these 33 individuals contracted the disease by coming in contact directly or indirectly, with those suffering with the disease before the patient was confined to the house, or during the confinement, or subsequent thereto during the convalescent period. Such cases of infection are classed as secondary when proven.

A person contracting the disease at some known point remote the primary infections in the territory under discussion and who subsequently succumbs and is reported in said territory is classed among imported cases.

Another classification of primary origin of infection may be where the water of a spring or river or other source becomes polluted with the germs of typhoid fever and thus is potent as a cause of spreading the contagion. In the following pages miscellaneous infection of these kinds occurring in Wilkes-Barre during the summer are described.

a. Typhoid Fever of Secondary Origin.

Secondary infection is the contraction of the disease through immediate contact with the body of the patient or with utensils or other mediums or transmission in the immediate zone of the patient, such as those of the household, for instance.

In every family where the disease occurred, the State Department of Health circular was placed. The following is a copy of it:

Rules to Be Observed In The Care and Management of Cases of

TYPHOID FEVER.

Wipe Out Typhoid By Killing The Germs In The Bed-pan.

The patient should be confined to one well lighted, well ventilated room, with screened windoows, preferably a room with southerly exposure, and as remote as possible from other occupied rooms in the house.

This room should be stripped of fancy curtans, carpets and upholstery and all other furniture not necessary for the comfort of the occupants.

Soiled bed and body clothing, including handkerchiefs and cloths used for collection of discharges from the nose and mouth, or those soiled by vomited matter, should be thoroughly disinfected. This may be done by placing in water and boiling for thirty minutes, or by use of some of the following chemical disinfections:

Make up disinfecting solutions by adding one-half ouce of Chlorinated Lime (Chloride of Lime or Bleaching Powder) to one gallon of water, or three teaspoonfuls of Creolin or eight teaspoonfuls of a solution of Formaldehyde (at least 37½ per cent.) to a pint of water.

The solution of formaldehyde is preferred.

A tub or other vessel containing a sufficient quantity of one of the disinfecting solutions should be kept in a convenient place for soaking bed and body linen.

Place all such clothing in this vessel immediately upon its removal from the bed or body of the patient, and allow it to soak for at least three hours after which it should be boiled for one hour.

Do not carry such infected clothing through the house, or store it with other soiled material.

Remnants of foods left by the patient should be burned.

The nurse, or attendant, should not use eating utensils or drinking vessels from the sick room nor should she permit others to do so until they have been boiled for at least one-half hour.

A basin or other vessel containing Bichloride of Mercury Solution (one tablet to one quart of water) or other good antiseptic solution should be kept constantly made up so that the hands may immediately be washed after handling any secretions or clothing from the patient.

The typhoid germs contained in discharges from the bowels, or any vomited matter should be disinfected by the addition of a quantity of the standard solution of Chlorinated Lime (Chloride of Lime or Bleaching Powder) or Creolin, sufficient to more than cover the discharges, or if the discharges are liquid add a quantity equal in bulk.

The mass formed should be thoroughly stirred, breaking up any solid masses and the vessel with contents should be allowed to stand at least one-half hour before emptying.

Never empty the discharges upon the surface of the ground or into a stream.

If a sewerage system exists, use it, but only after a thorough disinfection of the discharges.

If a privy well exists, use that, or bury the disinfected material one foot below the surface of the ground and not less than one hundred feet from a well or water course. It must be out of the reach of dogs and rats as they will carry the filth on their feet into residences.

Add a disinfecting solution to all water that has been used for bathing the patient, and dispose of it in the same manner as the body discharges.

The air of the sick room cannot be disinfected during occupancy by the patient. The practice of hanging up cloths saturated with carbolic acid or of placing saucers of chlorinated lime or proprietory disinfectants in the sick room is not only annoying to the patient, but utterly useless and often injurious.

An abundance of fresh air should be admitted to the room, but the patient should be protected from direct draughts.

Flies must be carefully excluded from the room and any that find entrance should be killed.

Dogs, cats and other household pets should be qauarantined and disinfected, and any found running loose should be killed.

Kissing the patient should be prohibited.

Individual milk bottles should not be taken into or removed from the premises during the existence of the disease. The householder should set a vessel out to receive the milk, and the person delivering the milk should pour it into such vessel without touching it with his hand, or with the vessel from which the milk is poured.

Visitors had best be excluded from the sick room. Aside from their disturbing influence on the patient they may through carelessness contract the disease.

Boil all water used for domestic purposes.

Individual milk bottles should not be taken into or removed from the premises during the existence of the disease.

Follow these rules during the entire illness, do not relax them during convalescence, but continue until entire recovery, as the specific germ of typhoid may exist in the stools or urine of typhoid patients for at least four weeks after the disappearance of the fever.

After the removal of the patient, the sick room and everything it contains SHOULD BE DISINFECTED BY FORMALDEHYDE GAS. The bed and body clothing should be disinfected by boiling or should be soaked for three hours in one of the antiseptic solutions already described.

The Act of May 14th, 1909, requires health authorities to place a warning placard, in a conspicuous place, on all premises where typhoid fever exists.

Section 24. Any person who shall remove, deface, cover up, or destroy or cause to be removed, defaced, covered up, or destroyed, any placard relating to any of the diseases mentioned in Section 2 of this Act, shall for any such offence upon conviction thereof in a summary proceeding before any magistrate or justice of the peace of the county wherein such offense was committed, be sentenced to pay a fine of not less than ten ($10) dollars, or more than one hundred ($100) dollars, to be paid to the use of said county, or to be imprisoned in the county jail for a period of not less than ten days or more than thirty days, or both, at the discretion of the court; and any person who shall violate any of the quarantine restrictions imposed by this act, the rules and regulations of the health authorities of any city, borough or township of the first class, or of the State Department of Health, or who shall interfere with the said health authorities or agents thereof in the discharge of his or their duties, as provided for in this act, shall, for every such offense, upon conviction thereof in a summary proceeding before any magistrate or justice of the peace of the county wherein such offense was committed, be sentenced to pay a fine of not less than fifty ($50) dollars or more than one hundred ($100) dollars, to be paid to the use of the said county, or to be imprisoned in the county jail for a period of not less than ten or more than thirty days, or both, at the discretion of the court.

SAMUEL G. DIXON,
Commissioner of Health.

Three visiting nurses were appointed by the Sanitary Committee of City Councils at the suggestion of the State authorities to work among typhoid fever cases in the city in an effort to minimize the danger of a spread of the contagion. They were Miss Elizabeth Miller, Miss Georgia Grossman and Miss Margaret Kohout. Each is a graduate of a training school. They visited the home on each instance where the patient was there being treated and where the family willingly received the service. The nurse had nothing to do with the administration of medicine or the conduct of the case as far as the physician was concerned, but it was her duty to see that the sanitary precautions prescribed were being carried out in the household. Special attention was paid to proper disinfection and the removal of the greatest dangers of secondary infection. In some instances filthy conditions were found on the property, and other officers employed by the city entered and abated the nuisances. The nurses were instrumental in having some of the patients removed to hospitals.

Where families have been temporarily broken up by the disease, parents being taken to the hospitals and the children scattered among friends, the nurses visited all the homes where the children were staying and saw that proper precautions were taken to prevent a spread of the disease.

In cases where milk was produced on the premises where typhoid existed, the nurses went to the customers and warned them to boil the milk and then watched for the first evidences of sickness with a view of preventing a spread of the contagion.

Every case of typhoid developed in the city since July 1st was visited by a nurse and where the services were welcome the nurses made frequent calls, sometimes two or three a day.

This work has shown practical results. Secondary infection has been kept down to a minimum. There are seventeen cases only known to the Department. In the following table data relative to these cases are given:

City Typhoid Cases Classified as Secondary Infection on Evidence at Hand. 1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
June 20	Ed. Rehill, 341 Scott St.,	26	3	Motorman.
July 4	Mrs. R. H. Wallace, 94 Academy,	26	3	At home.
July 24	Neal McHugh, 375 Scott,	22	4	Laborer.
July 30	Wm. Donlan, 63 Baltimore L.,	13	9	At home.
Aug. 13	Anna Conwell, 60 Baltimore L.,	5	11	At home.
Aug. 28	Dr. A. J. Caffery, Mercy Hospital,	26	--------	Res. physician.
Aug. 31	C. F. McLaughlin, 48 Maxwell,	38	8	Health officer.
Sept. 5	Mrs. Frank March, 734 S. Main,	24	5	At home.
Aug. 12	Genevieve Boyle, 85 S. Wells,	14	5	School
Sept. 7	Emma Adolph, 51 N. Wells,	15	8	At home.
Sept. 7	Wm. Adolph, 51 N. Wells St.,	12	--------	At home.
Sept. 6	Harry Adolph, 51 N. Wells,	20	--------	Mechanic.
July 25	Catharine Kreidler, 188 Park Ave.,	14	8	At home.
Aug. 11	Eliza Wideman, 70 Hazle,	18	5	At home.
Aug. 24	Lewis Schrage, 15 Mallery,	44	5	Merchant.
Aug. 24	Leander Haddock, 132 Park Ave.,	19	10	At home.
Aug. 28	Bertha Bombe, 72 S. River,	16	7	Domestic.

Edw. Rehill was the only one sick in his family, they drank public water and had a private milk supply. He was a motorman and was sick but walked about for two weeks before he went to bed. He was admitted to Mercy Hospital July 3d and discharged July 16th. He was an intimate friend and constant associate of Thos. Donlan, age 17, of 63 Baltimore Lane, and they went together up to the time of Thomas' onset and admission to hospital June 13th.

Mrs. R. H. Wallace brought to her home in the city, baby Margaret, the eleven months old daughter of her sister-in-law, Ellen, of Wyoming borough, in order that the baby might escape the contagion. However, the next day, June 5th, the child developed the disease and the case has been classified as an imported one, the origin being secondary from the mother. Mrs. R. H. Wallace nursed the child and fondled and kissed it and in this way contracted the infection and came down with typhoid on July 4th.

Neal McHugh was employed as a laborer at the D. & H. Washery No. 3, and drank water there. He is a nephew of Morris McMennigle, age 21, and an associate. They lived together. Morris was stricken July 17th, and admitted to Mercy Hospital July 19th. Neal slept in the bed vacated by Morris and a week later he was also stricken. No fumigation or disinfection was undertaken and there was an entire neglect of precautionary measures in the family.

The milk supply was from Leonard and occasionally from Mrs. McGinley, the source in each instance being the Vosburg Creamery. Neal drank water from the toll gate spring along the boulevard, which spring was found to be polluted and was closed by the Department. The case seems to be clearly one of secondary infection.

Wm. Donlan, the brother of Thomas, lived at home. So far as ascertained he had attended no picnics or public park, but he frequently ate ice cream. He went bathing in Coal Brook every day. He was not admitted to Mercy Hospital until August 19th. He was discharged therefrom September 4th. There is the second case of the disease contracted by contagion in the household, and there was a third, making four victims out of a family of nine. The third case was that of Mrs. McDonald, a married sister living at Sugar Notch borough, who visited her brothers and saw Thomas, Neal and William and Ed. Rehill before they were taken to the hospital. She came down with typhoid on August 8th at her home in Sugar Notch and is classified among the victims of the disease in the Wyoming Vallley outside of Wilkes-Barre.

Anna Conwell is a cousin of Ruth and Edith Conwell, who live in the neighborhood at 132 Spring Street, and who came down with typhoid on August 1st with a light form of the disease. She played with her cousins and they visited back and forth. Anna drank boiled water at home. The family consumed little mik. A half pint was purchased two or three times a week from Brown or Leonard. The children drank raw water from the same cup at the hydrant in the back yard where they often played. Considering the numbers in the two families, Ruth and Edith being members of a household of thirteen and Anna being a member of a household of eleven, together with the fact that they were sick at home, and the necessity of precautionary measures to prevent the spread of the infection were not keenly realized, it is remarkable that more cases were not recorded in these families. Investigations revealed nothing of note indicative of the origin of Anna's infection, excepting that of contact with her cousins, and it is so classified.

Dr. A. J. Cattery did all the laboratory work relative to typhoid fever at Mercy Hospital. This case is believed by the experts at the hospital to be due to contact with the infection at the laboratory. A worker with these pathogenic poisons is always subjected to danger of infection. Not a few laboratory experts, taking the history of typhoid throughout the country, have succumbed to the disease, and this bears evidence to the difficulties of warding off an attack when once these insidious foes to life and health gain admission to the household or become distributed throughout a community.

C. F. McLaughlin was a City Sanitary Inspector and in the course of his duty he visited several typhoid cases, and in this way it is believed he contracted the disease. The family was supplied with Crawley milk which has not been suspected. Boiled public water was used in the home and Blue Rock water was used for drinking. The patient was careful about water and milk. He ate some fruit purchased at a store, but no significance is attached to this fact. The other members of the household enjoy sound health.

Mrs. Frank March nursed her husband who was stricken with typhoid on August 15th and was admitted to Mercy Hospital on August 22nd. This is clearly a case of secondary infection. After moving from 88 Poplar Street to the address given in the table, she came down with the disease and was also admitted to the hospital.

The cases of Boyle and the three Adolph's have been described under Thoma milk infection. The cases of Kreidler, Wideman, Schrage, Haddock, and Bombe have been described under Rineman milk infection.

These 17 cases of secondary infection came from primary cases of which 6 were attributed to Thoma milk, 5 to Rineman milk, 4 to unknown origin, 1 imported and 1 from Vulcan spring.

(b. Imported Typhoid Fever Cases.)

There were imported in Wilkes-Barre 6 cases of typhoid fever. They are named in the following table. References have hereinbefore been made to all but the case of Harriet Scott.

Imported Typhoid Fever Cases. 1910.

Date of onset.	Patient.	Age.	No. in family.	Occupation.
June 5	Margaret Wallace, 94 Academy,	1	3	At home.
July 1	Cecelia Haddock, 123 Parke Ave.,	18	10	At home.
July 16	Harriet Scott; 177 Sanbourne,	26	4	Nurse.
July 24	Samuel Haddock, 132 Parke Ave.,	16	10	At home.
Aug. 13	Mrs. S. Cady, 280 E. Northampton,	41	8	At home.
Sept. 6	Anna Leofield, 35 Alexander,	8	8	At home.

Margaret Wallace is the daughter of Ellen Wallace of Wyoming borough. The baby was brought to Wilkes-Barre by Stella Wallace sister of Ellen Wallace, because of the latter being stricken with typhoid fever. The child developed typhoid on the 5th of June and was nursed by her aunt who subsequently came down with the disease, and was classed as a secondary infection victim.

Cecilia Haddock's contraction of the disease remains in doubt. It may have been at her home in Wilkes-Barre or at the Billings farm near Trucksville where her father had been stricken with the disease two years before.

Harriet Scott nursed the Ellen Wallace case of typhoid fever in Wyoming borough, onset May 23rd. Feeling ill she went on a visit to her mother at White Haven on June 23rd, and returning developed the fever and was admitted to the City Hospital July 16th, it being a clear case of secondary infection.

Samuel Haddock was one of the five who came down with typhoid fever at the Billings farm in Jackson township. He was brought home with a well developed case of pronounced secondary infection.

Mrs. S. Cady had been visiting at Youngstown, Ohio, up to two weeks before her coming to Wilkes-Barre, a victim of typhoid fever. Two cases of the disease have since developed in the Youngstown home. This, and all but one of the cases in the above table are clearly imported ones and all may be eliminated from further consideration.

c. Typhoid Fever Infection due to Water and the Examination of Spring and Bottled Waters. Explanation.

A number of cases of typhoid fever occurring in Wilkes-Barre during the summer have been attributed to the use of the Susquehanna River due to boating, bathing, and washing, also to the use for drinking purposes of the Vulcan Spring. The water supply to the public at Becker's restaurant was found to be polluted and this led to the Department to examine the source of the supply at Mr. Becker's farm. Bottled and spring waters were examined and also a number of private wells used by families in which typhoid fever occurred.

Typhoid Fever Due to Boating, Bathing, and Washing in the River.

In the table giving the names of those whose typhoid fever cases have been attributed to the use of the river for boating or washing all those but Renna's case have been described to some extent hereinbefore. John Renna was the only one of a family of 7 to contract the disease. The family used condensed milk only. The children played along the river shore. This was the only suspicious circumstance. The Vaulker and Becker cases are explained sufficiently under milk infection.

The North Branch of the Susquehanna River flows through Luzerne county in a general southwesterly direction, and it receives the sewage of the towns along its banks. The City of Wilkes-Barre is bounded by this river on the northwest. Opposite the city is the borough of Dorranceton, there being two highway bridges spanning the stream connecting the municipalities, one at West Market Street, leading to the public square and heart of the city and the other at West North Street, distant up stream about a quarter of a mile. Along the bank of the river in this section of the town, there is a beautiful park and public thoroughfare known as River Street. The residences of many of Wilkes-Barre's richest citizens front on this street, and the new Court House stands on an eminence on the river bank at one end of the parkway. The people of the city throng the walks of the park and occupy the benches under the shade trees, especially on Sundays and holidays. A floating boat and bathing houses is moored to the bank, the privilege being leased. On the opposite bank in Dorranceton is a tract of land, partially wooded, stretching along the river from the Market Street bridge up stream, which was deeded to the city for park purposes known as Nesbitt Park. It is maintained by the Park Commissioners. It has been the custom for the youths of the city to swim in the water of the Susquehanna at any convenient point. This custom has been brought under the regulation and control of the Park Board. The beach has been improved through Nesbitt Park, two life guards are stationed there, a summer bathing house is provided and also a diving float. Instructions in swimming are given gratuitously. Scores of young men avail themselves of these facilities.

A few hundred feet above this bathing beach the 24-inch sewer outlet of the Dorranceton sewerage system, empties into the river. So also does a 3-foot 6-inch brick sewer belonging to the city and two 24-inch sewers and two 15-inch sewers, besides two large storm drains owned by the city.

Above the private boat and bathing house the main sewer of the city, a 6-foot brick structure, empties into the river at the Market Street bridge, and within less than 100 feet of the said boat house a 15-inch sewer discharges into the river.

The waters of the Susquehanna are sewage polluted and filthy and totally unsafe to bath in. If the facts could be known, much sickness would be annually traced to bathing in these waters. During a typhoid outbreak, when the specific poison of typhoid is emptied from these sewers into the river, the danger is even greater. In the following table are given the names of those who are believed to have contracted typhoid fever from the river. A careful study has been made of each case as the basis for the conculsion in each instance:

River Infected Typhoid Cases. 1910.

Date of onset.	Patient.	Age.	No. in family.	Occupation.
July 7	Albin Sholinsky, 83 Logan St.,	14	7	Bowling alley.
July 27	Bertha Schulte, 255 Park Ave.,	21	6	Silk mill.
Aug. 2	Harry Baur, 328 E. South,	21	7	Vulcan iron.
Aug. 11	Scott Van Horn, 15 Magnolia,	16	3	Clerk.
Aug. 23	Gertrude Edwards, 377 N. Washington,	18	9	At home.
Sept. 5	Harry Hauser, 209 McLean St.,	18	9	Laborer.
Aug. 8	Martin Voelkey, 52 S. Hancock,	6	5	At home.
Aug. 15	Rose Becker, 246 N. Washington,	14	7	School.
July 15	John Renna, 604 Hazel St.,	5	7	At home.

Albin Sholinsky was the only one sick in his family. He was employed in a bowling alley and bathed daily in the river. Condensed milk was used at the household. If the reports be true, the only thing which Albin did, not done by the other members of the family, which would have subjected him to typhoid infection, was the bathing in the river.

Bertha Schulte was employed at the Hess and Goldsmith silk mill, drank the public water there. The ages of her brothers and sisters range from 10 to 23 years. She was the only member of the family contracting typhoid. None of her friends and acquaintances have had the disease. The suspicious circumstances in connection with her case is the fact that she boated frequently on the river and trailed her hands in the water.

Harry Bauer was employed at the Vulcan Iron Works in the machine shop. He was particular about water and drank tea only from his lunch pail at the works. At home the family was supplied with boiled public water. He took all meals at home, carried lunches and ate no fruit. No other member of the family contracted typhoid. Harry bathed in the river frequently and to this fact the origin of the case is attributed.

Scott Van Horn was employed in the office of the Times-Leader where he obtained Pocono Spring water At home the supply was bottled water and boiled milk. He bathed in the river frequently up to within a few days of the onset of the fever.

Gertrude Edwards obtained boiled public water at home and ate ice cream at various places. She had what was thought to be a touch of malarial fever all summer. The milk supply was from a source free from suspicion. She boated on the river up to August 20th and trailed her hands in the water, so it is reported. No other case of typhoid fever occurred in her family. The case might have come from polluted ice cream, of which she partook freely. However, the river is known to be grossly contaminated and to this source of infection the case is attributed.

Harry Hauser was employed at the Ashley shops where he drank public water, iced. At home condensed milk was used. He ate freely of ice cream around town and particularly at Rau's store. Some milk was gotten there. He also was fond of fruit. Returning from a vacation on August 15th he bathed in the river often and to this origin the case is ascribed.

On August 15th, 1910, the Commissioner of Health communicated with the Park Commission about the danger attending the custom of river bathing. This letter was referred by the Park Board to the Sanitary Committee and in turn was referred to the City Solicitor. The correspondence is given in full herewith.

"Harrisburg, August 15th, 1910.

"Wilkes-Barre Park Commission, Edmund E. Jones, Secretary.

"Dear Sir: Probably your attention has never been called to the danger attending the custom of bathing in the Susquehanna river opposite Wilkes-Barre.

"The river in this locality is a highly sewage polluted stream and those who frequent its waters between Market and North Streets, where public bathing is regulated under city supervision, are liable to infection therefrom.

"These matters are brought to your notice in order that you may give them prompt consideration and take such action in the premises as the interests of public health demand.

Yours truly,
SAMUEL G. DIXON,
Commissioner of Health."

"Wilkes-Barre, Pa., August 18th, 1910.

"Mr. E. B. Morgan, Chairman, Sanitary Committee.

"Dear Sir: Enclosed you will find copy of letter received from the State Department of Health with regard to the use of the Susquehanna river for swimming purposes, which will explain itself.

"I have been authorized by the President of the Park Commission to refer this communication to the Sanitary Committee of the City Councils to take whatever action they may think proper under the circumstances.

Very respectfully,
EDMUND E. JONES, Sec."

"Wilkes-Barre, Pa., August 18th, 1910.

"Chas. F. McHugh, Esq., City Solicitor.

"Dear Sir: The enclosed communication from the Commissioner of Health of the Commonwealth of Pennsylvania to the Park Commission relative to the custom of bathing in the sewage polluted water of the Susquehanna river to the prejudice of public health, and the communication from the Park Commission to the Sanitary Committee of Councils referring the matter to said committee for action, are respectfully submitted to you with the request for advice as to the best method of procedure to carry out in an effective manner the suggestions of the Commissioner of Health implying a discontinuance and prohibition of bathing in the river within the city limits.

Yours truly,
EDWARD B. MORGAN,
Chairman Sanitary Committee."

The city took down the bathing house and closed the beach. The proprietor of the private bathing house was requested to stop renting suits and the hire of boats. No swimming in the river has since been observed. The people readily comprehended the situation and acquiesced without protest. If all sanitary regulations were understood and obeyed as readily, the elimination of infectious and contagious diseases would be a matter of quick accomplishment.

Typhoid Fever Due to the Vulcan Spring.

The Vulcan Spring is located on the right hand side of the main tracks of the Central Railroad of New Jersey, approaching Wilkes-Barre from the south. The tracks of this railroad are laid in a cut through which the trains pass under a highway bridge at Blackman Street. To the north of this bridge at the foot of an embankment 20 feet high, there is a copious flowing spring. Its source is hidden in an old mine drift that has been walled up back in the embankment and is covered by a superstructure carried up 10 feet or more above the level of the ground at the top of the embankment. On this upper ground floor in the home there is a pump used to raise the water from the well. Formerly J. R. Perry bottled and sold the water. Now the privilege of using the pump is leased by the Vulcan Iron Works. Said iron company plant occupies the block to the west of the cut and west of South Main Street that parallels the railroad. The spring water is conveyed in barrels from the pump house to the works. There is no public access to the pump. The Department on August 25th analyzed the well water at the spring house and found it uncontaminated and since then no suspicion has been held of the purity of the water in the well; but this is not true of the water of the spring where it flows out underneath the wall into the railroad gutter.

There is a space of 5 feet only between the railroad ties and the wall, which space is occupied by the railroad ditch extending through the cut. The surplus water from the inside well (fed from the mine drift) flows out on a level with the gutter or a few inches above it. In dry times a very considerable flow may be seen from this spring running northerly along the gutter several hundred feet towards Parrish Street—a grade crossing—but before reaching this street it is conveyed westerly under the tracks of the railroad and of the parallel tracks of the Lehigh Valley Railroad and under South Main Street across land of the Vulcan Iron Works to the drainage system substituted by the Pennsylvania Railroad for the old canal. This portion of the ditch drainage is underground. South of the spring in dry times no flow is seen but in rainy weather torrents of water from a large area thickly populated adjacent to and south of Blackman Street flow northerly in the ditch and submerge the open spring two feet or more in depth.

North of Parrish Street is Colliery No. 5 to which 12 water boys carry water from the spring to supply the several hundred miners for drinking purposes. At times, in order to bucket the spring water up, the user will scoop out a sump in the dirt at the side of the railroad ditch and at the point where the water comes out under the brick wall. A tin can was found at the spring. It was used as a common drinking cup. At least two hundred families in the vicinity depend on this spring water for drinking purposes.

On September 2nd a Department inspector was stationed at the spring between the hours of 9 a. m. and 1 p. m. During this time 67 pails of water were carried away, 66 being filled by dippers brought to the spring from the homes of the carriers. One hundred and eighty-one persons drank at the spring and 115 of them used the tin cup, the others using their own dippers. Fifty of these people resorted to the spring during the noon hour. The nearby switchman reports having seen 75 people waiting their turn at the spring.

Passenger coaches with toilets pass over the tracks nearest the ditch. Boys make a practice of wading in the ditch and the spring. At least 4,000 feet of paved streets drain thereto and on the tributary watershed there were many typhoid fever cases during the summer. In one instance noted, from the Marsh household, laundry water was thrown out on the ground slightly over 100 feet from the ditch and 1,000 feet from the spring. Mr. Jackson, the manager of the Vulcan Iron Works did not suspect the well water of being impure but on September 6th he agreed to close up the opening under the wall, dam the water up to a higher level in the well and insert an overflow pipe through the wall from the outside end of which the spring water could be secured by the public. This would obviate pollution from the ditch except in stormy weather when the public did not use the water on account of inaccessibility; but it would not obviate the danger of the common drinking cup. However, it was subsequently found that there was a height of 7 inches only available and the change was abandoned. On September 12th the Department insisted that the open spring should be closed and asked the railroad company to prohibit trespassers along its tracks. Prior to this time the spring had been placarded but this did no good.

On September 13th the supervisor received the following instruction from William Twining, Engineer Maintenance of Way:

"The State Board of Health claims that many cases of typhoid fever in the city of Wilkes-Barre are traceable to the spring along our west main track immediately east of Parrish Street crossing at South Wilkes-Barre.

"In order to prevent any further use of this spring and at the same time avoid accident to trespassers on our property, I wish you would arrange at once to lower the ditch, blasting out rock, if necessary, along our west track and laying a 4-inch tile pipe from the spring to the 12-inch or 16-inch cast iron pipe laid beneath our main tracks immediately east of Parrish Street crossing, constructing a catch basin, burying the tile pipe the usual depth of ditch at this point."

On September 20th this work was accomplished and the spring was absolutely obliterated.

In the following table are given the names of typhoid fever cases who habitually used Vulcan Spring water for drinking purposes, with one exception previously noted:

Vulcan Spring Infected Typhoid Cases. 1916.

Date of onset.	Patient.	Age.	No. in family.	Employment.
July 25	Florence Davis, 212 McLean St.,	6	4	At home.
Aug. 26	Wm Abraham, 312 High St.,	32	6	Laborer.
Aug. 26	Eliza Kratz, 47 Jones St.,	17	9	Factory.
Sept. 18	Sam. Williams, 124 Parrish St.,	5	5	At home.
Aug. 12	C. F. Wolfe, 734 S. Main St.,	24	4	Laborer.
Aug. 15	Frank Marsh, 88 Poplar St.,	30	5	Laborer.
Aug. 15	Pearl Meyers, 77 Covell St.,	25	7	At home.
Sept. 2	John Womer, 81 Covell St.,	51	3	Laborer
Sept. 7	Geo. Czrowenka, 132 Blackman St.,	18	9	Miner.

The cases of Davis, Kratz, Abraham and Williams have been previously described.

C. F. Wolfe used condensed milk only. The family of four was supplied with Vulcan Spring water. There was no other suspicious circumstance attending his case except that he knew the Marsh family, being slightly related. He drank water frequently while at the spring. The Marsh onset was subsequent to that of Wolfe. Frank Marsh used condensed milk only. He was a laborer employed at the Vulcan Iron Works. He drank water at the spring and took it home. Mrs. Marsh contracted tphoid fever September 5th. Her case is classed secondary to that of her husband. Pearl Myers did house work at home where condensed milk only was used. Water for drinking purposes was brought from the Vulcan spring. She was the only one of a family of 7 to have typhoid. Her father and one sister were ill at the same time, but their cases were not reported as typhoid. The Department did not follow this up to ascertain positively the nature of the ailment.

John Womer was employed as a laborer at the Vulcan Iron Works. The milk supply was obtained from his own cow kept on the premises. Drinking water was carried to the house from the Vulcan spring. Pearl Myers whose onset was eighteen days earlier lived next door; but the families were not intimate and did not come in contact, it is believed. George Czrowenka was employed at No. 5 colliery. George drank Vulcan spring water but the other members of the family who were free from the disease had drinking water from Thoma well.

In none of these cases were there other suspicious cause of the infection than from the Vulcan spring. It should be remembered, in considering 9 cases as too few to attribute to an infected spring used by several thousand people, that the flow from the spring was strong and carried away quickly most of the polluting matter. It is possible of course that not a case of typhoid fever originated from this source. In the Department's classification the Vulcan spring cases are considered as probable for lack of better evidence. It is known that a number of people, who were carrying typhoid infection, frequented the spring and used the cup and furthermore there is no doubt that had the inside well been exposed to the public the contagion would have reached more people.

Examination of Spring and Bottled Waters.

The Department's investigations revealed the fact that some of the spring and bottled water used by the public in Wilkes-Barre was not as pure as the city's water supply. Uncleansed bottles and stoppers were found to be the means of spreading pollution. Dealers in mineral waters were required to furnish information about their business and these statements were checked up by investigations. After carefully analyzing samples of water taken from offices, distributing wagons, at the bottling works and sources of supply, the Department found some of this water to be dangerous to public health. In some cases the contamination in the samples were due to unsanitary methods of bottling rather than to the condition of the water at the springs. Warnings were issued to firms and also to consumers. On August 29th, 1910, the Commissioner of Health issued the following notice to dealers in bottled and spring water, the same being published in Wilkes-Barre newspapers.

"Notice to Dealers in Bottled and Spring Waters."

"At all times bottled water and water shipped or conveyed for public or private consumption in Wilkes-Barre should be pure and wholesome. Some of the spring or well water supplied to the public in Wilkes-Barre has been analyzed by the State Department of Health and found to be impure and unfit for public use. Especially at the present time while typhoid fever is prevalent should precaution be taken to prevent transmission of the infection through the medium of bottles or vessels or through the water itself.

"An unusual amount of spring water is now being supplied to the people of Wilkes-Barre. Rural residents are engaging for profit in the business of hauling and delivering the spring water to those who fear to use for drinking purposes the public water supply. Caution is extremely necessary.

"Individual water bottles should not be taken into or be removed from the premises whereon there is a case of typhoid fever, during the existence of the disease in the household nor thereafter during convalescence.

"The householder or proprietor should set a bottle or vessel outside to receive the water and the person delivering the water should pour it into such bottle or vessel without touching it with his hand or without touching it with the container from which the water is poured and without the use of any funnel or any device which he might carry around to facilitate the delivery of the water to the customer's receptacle.

"Every shipper of water to be consumed in Wilkes-Barre and every dealer in spring or bottled water to be sold in Wilkes-Barre should register at the office of the city clerk or be prohibited from shipping or selling water to the public in the city, and he will register or suffer the consequences. Such shipper or dealer should forthwith report to the city clerk any sickness at the farm or source of water supply or among employes engaged in handling or delivering the water.

SAMUEL G. DIXON,
"Commissioner of Health."

An investigation of the plant ond output of the principal dealers was conducted by the Department and in the following table the names of the several waters are given in alphabetical order:

1. Blue Rock Water.
2. Diamond Spring Water.
3. Evans Farm Water.
4. Fairview Spring Water.
5. Glen Summit Water.
6. Hydrox Water.
7. Oostanala Spring Water.
8. Pocono Mineral Spring Water.
9. Shawnee Water.
10. Becker Artesian Water.

1. BLUE ROCK WATER. The Blue Rock Water Company is a co-partnership formed by D. W. Thomas and Evan Challis, both of Wilkes-Barre, and others. The spring is located on the farm of J. D. Thomas, Spring Brook Township, Lackawanna County. Mr. Challis is manager of the business. The bottled water is shipped each morning on the Wilkes-Barre and Eastern Railroad, arriving at Plains, the terminus of the road about noon. Empty bottles are shipped back every afternoon, leaving Plains about 1 P. M.

The spring is cemented up and covered over so that it cannot be seen. The location is on the hillside. The Thomas dwelling is 6 feet higher than the spring and 60 feet distant. The outhouse is on the same level as the spring and some hundred feet distant. The vault is dug in the earth. Mr. John Thomas lives on the farm during the summer. No one occupies the place during the winter. Kitchen wastes are thrown out on the ground.

There is a one-inch galvanized pipe extending from the spring outside. The only way the water could be polluted is by carelessness on the part of the person filling the bottles which are held under the end of the pipe. No apparatus is provided for sterilizing the vessel. Each bottle holds five gallons. The water is hauled from the farm to the railroad near the viaduct where the train stops to take on the bottles. At Plains an employe takes the bottles off the cars into a wagon and delivers them about the city. He collects empty bottles and ships them back to the farm. These empties are not sterilized. They are simply rinsed out with clean water before using again. The stoppers are cork. New stoppers are used each time the bottle is filled, so it was reported; but the Department doubts the fact. Each five gallon bottle is fitted into a crate of its own, having springs on the side to hold the bottle in place. The crate is hinged on a stand to facilitate tipping of the bottle for the pouring out of the water to a glass. The stand, crate and bottle, comprise the entire apparatus set up on the premises of the customer. When the bottle becomes empty it is taken out by the company and a filled bottle is put in its place.

To some customers desiring it, a cooling stand is supplied. The stand is of metal and pulp construction. There is an ice container in it. The bottle is turned up with the nozzle down, the nozzle being fitted into a rubber gasket and funnel leading to the pipe in the cooler and terminating in the faucet. This device is used at the Challis barber shop, at city hall and at numerous places in the city. The following table the results of the analyses of the Blue Rock water are given:

Blue Rock Water Analyses. 1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Aug. 24	At City Hall,	2,500	40
30	At Electric Light Co. office,	1,080	10
30	On delivery wagon,	230	13
30	At Challis barber shop,	280	17
31	At spring—end of pipe,	4	0
31	At spring—end of pipe,	2	0
Sept. 8	At Electric Light Co. office,	240	0
21	At City Hall,	1,800	0
21	At police headquarters,	10	0

The following communication was sent to the water company concerning the analyses:

"August 30th, 1910.

"Blue Rock Water Co., Wilkes-Barre, Pa.

"Gentlemen: A sample of your water was collected in Wilkes-Barre and analyzed by the State Department of Health and the water was found to be impure and not suitable for public uses. Possibly the pollution of that water was due to the process of handing the water either at the source or here in Wilkes-Barre. The subject will be looked into thoroughly and you are requested to co-operate with Mr. F. Herbert Snow, Chief Engineer of my Department, who is stationed at Hotel Sterling, with a view to putting into effect remedial measures.

"All bottles and water containers should be thoroughly sterilized before they are again filled with spring water. Where the stoppers are cork, a new stopper should be used each time the bottle is filled for shipment.

"You should not permit any of your bottles or vessels to be taken into a household or building where there is a case of typhoid fever, neither should you remove any bottle or vessel from such premises during the existence of typhoid fever, or the convalescent period of the patient. The householder should place a bottle or vessel outside and the water should be poured into it, the employe not touching the householder's bottle with his hands or with the container from which the water is poured, neither should the customer's vessel be touched with any funnel or other device which might be used to facilitate the delivery of the water into the customer's container.

"Attention to these matters will prevent any possible spread of the infection from a typhoid case, through the medium of your bottles or containers to some other person.

"Yours very truly,

"SAMUEL G. DIXON,

"Commissioner of Healthh."

2. DIAMOND SPRING WATER. The Diamond spring is located on the William Roberts farm in Fairview Township, Luzerne County, near Glen Summit. It is a pool formed by a stone dam located at the head of a creek in the woods on the hillside. Some surface drainage from the uninhabited mountain slope can reach the pool. Accidental contamination of the waters of the brook are possible. The Department stopped the traffic in this water because of this fact, although the samples collected showed no pollution. The tests are given in the following table:

Diamond Spring Water Analyses. 1910.

Date of collection.	Sample	Bacteria Per C. C.	
		Total.	B. Coli.
Aug. 24	At city hall,	700	0
30	Spring at Roberts' farm,	140	0
Sept. 8	Swanback's drug store,	1,500	0
12	From faucet, Roberts' farm house,	300	0
12	At spring, Roberts' farm,	24	0

3. EVANS FARM WATER. Mr. B. S. Evans, of West Trucksville, Kingston Township, resides on a small property on which there is a well. It is located up the hillside beyond all dwellings. The well is dry, is dug about 15 feet deep and stoned up. A drill hole 40 feet deep lined with six-inch pipe extending up 3 feet above the bottom of the well and capped, furnishes the water. From this 6-inch pipe a 1½ inch pipe is carried out horizontally until it reaches near the surface, whence it is extended down the hillside under cover of enough earth to keep the water from freezing in winter, the pipe terminating, one branch in the barn and the other at the house. The water flows continuously. There are water closets and a bath tub in the dwelling supplied with the water. On September 8th and up to that time Mr. Evans had bottled the water at the barn. No pretence to cleanliness was made. The bottles were set on a dirty floor. The cork stoppers looked dirty. Samples of the water showed upon examination, satisfactory results. The danger of contamination was in the handling of the water.

Evans Farm Water Analyses. 1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Sept. 5	From spigot at barn,	0	0
5	From spigot at cellar,	16	0
8	Out of bottle,	6,500	0

Mr. Evans has about 20 customers in Dorranceton, Kingston, Luzerne and Wilkes-Barre. Mrs. George Evans, of Dorranceton, was the only one among his customers having typhoid fever. The Department stopped the sale of this water until Mr. Evans complied with instructions about cleaning up the premises and relative to the cleansing and sterilizing of the bottles and the use of stoppers. He was ordered to desist from all bottling operations at the barn. The house basement room was put in a satisfactory condition and he subsequently bottled the water there.

4. FAIRVIEW SPRING WATER. The Fairview spring is on the farm of Avery Brothers, Fairview Township, near Glenn Summit. It is located on the hillside at the edge of the woods away from all possible pollution and is walled up, open, about ten feet square and the water is about 18 incnes deep. From this enclosure the water is piped out and flows continuously from the end of the pipe. The bottles are filled here. They are all 5 gallon demijohns in crates. About 150 of these bottles are hauled into Ashley and Wilkes-Barre every week from the farm. One team is engaged all the time in delivering the water to customers. All operations are conducted from the farm. The bottles are washed in hot water, banner lye being used. Cork stoppers are used. The old ones are thrown away. The new one are first scalded in hot water. The tests of the water were as follows:

Fairview Spring Water Analyses. 1910.

Date of collection.	Sample	Bacteria Per C. C.	
		Total.	B. Coli.
Aug. 30	Spring at farm,	6	0
Sept. 21	From bottle in town,	6	0
21	From bottle in town,	2	0

5. GLEN SUMMIT WATER. The Glen Summit Spring water is very extensively bottled and supplied in Wilkes-Barre and as far as New York City. The spring is situated on a tract of 230 acres of wild, uncultivated land, about one mile from the summer resort known as Glen Summit Springs, on the northern slope of the eastern end of the Nescopeck Mountain. The water gushes out of clean sand into a walled up enclosure, cemented tight and supporting a superstructure which is ventilated and kept under lock and key. The supply pipe leading from the spring is blocked in. The spring is deep seated and no surface water can get in. There appears to be no possibility of pollution.

The bottling house is a three story building and is constructed in the most improved manner. Each employe is required before beginning the day's work to take a bath and then clothe himself completely in garments provided by the proprietor, Mr. J. E. Patterson, of Wilkes-Barre. These garments are worn only while the employe is engaged in bottling water. The most approved appliances obtainable are used in cleansing the bottles and demijohns. A tank car containing a concrete receptacle is filled with this water and hauled to Wilkes-Barre where the water is bottled on Pennsylvania Avenue. The car is run on a side track and kept there until the tank is empty. The bottles are filled in the adjacent building by means of a hose attachment. This is the point of distribution throughout the city, and the bottles used in this trade are cleansed on the premises. The spring water is used altogether for washing; rinsing is done with this cool water unless the bottles be dirty, when caustic solutions are applied. The proprietor is about to abandon this bottling and have it all done at Glenn Summit where he purposes to install a sterilizing plant. Samples of the water collected by the Department, showed the following results:

Glen Summit Water Anaylses. 1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Aug. 24	Bottling Works, Wilkes-Barre,	5,400	0
Sept. 8	Bottling Works, Wilkes-Barre,	500	0
18	Bottling House, Glen Summit,	8	0
18	Bottling House, Glen Summit,	4	0
18	Bottling House, Glen Summit,	120	0

6. HYDROX WATER.—The Hydrox Spring is located in Kingston Township on the farm of Henry Nothoff, about one mile up the mountain beyond Luzerne borough. It is some distance away and higher than the dwellings, barn and privy. Nothoff operates a dairy and sells milk. He leases the water privilege to Dr. E. J. Davis and Dr. W. Stallsmith, proprietors of the Hydrox Spring water business.

The spring is enclosed in a cement wall supporting a stone house with wooden roof. The cement wall is about 4 feet high and the water rises to about the top of the wall. The pool formed is 3 feet wide and 4 feet long. The water overflows through a channel at one end into a second compartment three inches lower. This compartment is 8 feet long, 3 feet wide and 3 feet deep, the water standing nearly at the top, all enclosed in the spring house.

In the first section or spring pool there is a concrete coping to keep dirt from the floor from getting into the spring. About the second compartment the floor is on a level with the wall. In this pool or really trough, milk cans are placed for cooling purposes. The overflow from the cooling trough is out into the run nearby. From the spring pool a 1.5 inch pipe extends beyond the building to the outside where there is a little concrete platform on which the water falls and where the hydrox bottles are filled. The overflow from the cooling trough passes underneath this concrete platform so that there is no chance of the water from the cooling vat coming in contact with the water pipe form the spring pool. The flow from this spring is strong and ample for all purposes. There is a glass in the spring house with which water may be dipped from the spring. The members of the household get all their drinking water here and fill buckets by dipping them into the spring pool. In this way there is a possibility of contaminating the spring.

At the platform where the bottles are filled there is a faucet on the pipe. The empty demijohns—5 gallons each—are washed here with cold water. If any dirt is noted in the bottles a solution of chlorinated lime is used. Cork stoppers are used and not always is a new stopper put on. During dry weather a paper cap is applied over the stopper to keep the dust away.

The Hydrox water is hauled by wagon to Wilkes-Barre to the depot or distributing station of the company, 210 Barney Street. Here the half gallon bottles are filled and sealed and from here the water is delivered to customers in the city. Most of the water is supplied in the demijohn. The company has a driver who does nothing else but deliver water to city customers. Another team does the hauling from the farms. The empty bottles are washed out with hot water and re-stopped each time the bottle is filled.

The company furnishes metal standards for ice coolers. The company also furnishes demijohns in tipping crates. Such a crate was used at Hotel Sterling. A sample of the water collected from this crate in the hotel showed the presence of 720 B. Coli. The origin of the pollution was believed to have been found at the hotel. The stopper was taken out each time the hotel employe wished to draw water, tipping the crate and passing the water therefrom through a funnel into the carafe. The funnel was placed back on top of the demijohn and thus came in contact with the stopper that had been polluted by contact with the employe's hands. The next careful filled would contain some of the pollution washed from the funnel. In this way the sample of the water analyzed was contaminated. This illustrates the necessity for the attention to matters of personal hygiene if a drinking water is to be preserved pure and wholesome. Had the employe been a typhoid convalescent the carafe water might have spread the infection.

The Hydrox Water Company supplies water in the borough of Plymouth but not from the Hydrox spring. The Plymouth customers get water taken from a spring on land of Daniel VanLoon. The proprietors of the Hydrox water informed the Department that they had nothing to do with the spring water business in Plymouth. They admitted that VanLoon with their knowledge and consent used about ten of the demijohns and crates marked Hydrox Water. The VanLoon spring is located in the woods on the hillsides above Plymouth and is simply a hole in the ground cemented up on the sides, the walls being carried two feet above the surface of the ground formed a curb to keep out surface water. Stag picnic parties are held in the woods and empty beer bottles are plentiful under the trees. There is a pipe extending through the wall from the spring but there is not room enough between it and the ground to put a bottle under the pipe, so the only way for VanLoon to do is to fill his bottles from the spring by bucketing out the water. Originally there was a wooden flat cover over the spring but it was destroyed by vandals. The health officers of Plymouth were notified that this source of water was dangerous because of possible pollution. The Hydrox Water Company was ordered to withdraw its consent to the use of its vessels for the distribution of the VanLoon water. The company was also ordered to stop the use of the Hydrox spring by members of the Nothoff family and to provide and use a proper cleansing and sterilizing apparatus.

The company have a new spring higher up the mountain that is favorably located and can be protected from pollution by walling up and housing over. At present it receives some surface wash from a cultivated field. The water is piped to the barn. A sample of this new spring so called and a sample of the other waters were collected. The analyses are shown in the following table:

Hydrox Spring Water Analyses—1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Sept. 5	At dining room, Hotel Sterling,	1,800	720
12	Hydrox spring,	100	0
12	Pipe from spring,	8	0
12	VanLoon spring,	5,000	0
18	New spring—spigot at barn,	300	0
18	New spring—spigot at barn,	60	2
18	Hydrox spring,	10	0

7. OOSTANALA SPRING WATER.—The Oostanala Spring is located on the farm of Charles J. Weiss in Jackson Township beyond Trucksville. Mr. Weiss is engaged in bottling and selling spring water. He distributes 200 gallons per day in Kingston, Dorranceton and Wilkes-Barre. The spring is on the hillside above the buildings. Water gushes out of the rocks and a pool is formed 4 feet deep by the construction of a concrete wall carried up 4 feet high. It is entirely housed in a cement building supporting roof. There are four iron pipes extending through the cement wall with faucets attached to them. It is here that the water bottles are filled. The flow from the spring is quite strong. It operates a ram further down the hill which raises the water to the house and barn. The bottled water is carted by wagon to the customers. All bottles are washed at the farm. Hot water from the house with soap and lye are used for cleansing, the bottles are then rinsed out with cold spring water and then refilled, old corks are used. The tests of this water are given in the following table:

Oostanala Spring Water Analyses—1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Sept. 21	At spring,	22	0
21	At faucet, spring house,	10	0
21	At faucet, spring house,	20	0
21	From bottle in Wyoming,	24	0
21	From bottle in Dorranceton,	100	0

8. POCONO MINERAL SPRING WATER.—The Pocono Water Company is a chartered corporation doing business in Wilkes-Barre at 178 South Main Street. Hon. Wm. H. Hines is the president. A sample of the water supplied by this concern was collected on August 25th, from a cooler in the Finn Hotel and this sample was found to contain 10 B. Coli. The company was at once informed that a sample of its water had been found to be impure and not suitable for public use. It was suggested that the pollution might be due to careless handling of the Water. Mr. Hines responded by asking the Department to make a thorough investigation of his business and to offer suggestions. He claimed that some of his coolers had been known to be filled with other than spring water and that certain other dealers in spring water in the city had had similar experiences. Subsequently he declined to supply a number of hotels in the city because it was found that the proprietors were filling the bottles with public water and furnishing it to their patrons in the bottles and stands set up and owned by the Pocono Water Company.

The Hotel Finn sample was the only one of ten analyzed that showed pollution:

Pocono Mineral Spring Water Analyses—1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Aug. 25	At Finn Hotel,	1,680	10
30	At company's office, 178 S. Main,	80	0
30	At Hotel Sterling,	70	0
30	At company's office, 178 S. Main,	24	0
30	At Finn Hotel,	60	0
30	At spring,	6	0
30	At spring,	8	0
Sept. 8	At Hinkle Hotel,	1,080	0
8	From receiving tank, 178 S. Main,	160	0
8	From bottle at 178 S. Main,	900	0

The spring is located on the farm of Mr. Hines, in Bear Creek Township, Luzerne County, near Bear Creek Village, on the Lehigh Valley Railroad, where the bottles are shipped to Wilkes-Barre. The spring is known as Pocono Mineral Spring and it is an apparently pure gushing mountain spring, enclosed in concrete and entirely housed over with a wooden building. Everything about the place is very neat and there is no source of contamination on the mountain side above. The water comes up through sand and gravel and forms a pool 3 feet deep, 14 feet wide and 27 feet long. There is a pipe overflow which extends to the bottling house down the hill 300 feet distant. The bottles are filled from a faucet on this pipe. The water is shipped in 5 gallon glass demijohns. Not all of the five gallon bottles shipped from this spring in Wilkes-Barre are taken to the store. Some of them go directly to the customers from the express car.

The bottling house is a large two story frame building. The attendant resides in a dwelling on the farm. The privy vault on the property was full and overflowing. Inattention to petty details respecting sanitary conditions was evidenced in numerous directions. The Department's officer called the attendant's attention to these matters.

The emptied bottles returning from town are rinsed out in cold water at the bottling house. Soda solution is supposed to be used; but the employes said on the day of the Department's inspection, they were out of it. Cork stoppers are used. Both old and new ones were piled on the dirty floor. There was a hot water boiler in the cellar of the bottling house at the farm but it had not been recently used. The attendant was notified that hot water was necessary and that the bottles must be sterilized. The employe wears the same clothing when bottling as at other times.

At the company's office and receiving station at 178 South Main Street, Wilkes-Barre, there is a wooden tub lined with re-tinned copper, holding about 250 gallons. The water shipped in from the spring that is to be delivered to customers desiring 2 quart bottles, is first emptied into this tank. Several brass faucets are provided from which the two quart bottles are filled. These smaller bottles are stoppered with cork. When empty they are returned to this station and collected and thrown into a wooden tray 8 feet long and half filled with water for the purpose of soaking off the red labels on the bottle. The stoppers are then removed, the bottles are rinsed in fresh water from the receiving tank and then refilled with spring water, new stoppers are put on and the bottles are then again sent to the customers. The company installed a steam plant at 37 South Washington Street at the suggestion of the Department. The Departments suggestions to Mr. Hines were contained in a letter as follows:

"Hon. W. H. Hines, "Sept. 11th, 1910.
37 S. Washington St.,
Wilkes-Barre, Pa.

"Dear Sir:—Your attendant at the Pocono Mineral Spring is not paying due attention to the petty details in bottling and cleansing the bottles there which your interests and instructions demand. My inspectors report that the boiler in the cellar has not been used and no hot water is used for cleansing the bottles. Furthermore, the attendant did not have any soda solution at hand and could not give any special assurance as to how long he had been out of this solution.

"The old and new cork stoppers in the bottling house were thrown on the floor which was dirty. Some of your competitors take great pains with the stoppers. Your attendant had no particular excuse about the stoppers and seemed to think it was alright. You told my representative, Mr. Snow, that you would like a thorough investigation of your business and suggestions from the Department, and that you would be glad to follow them out. We have analyzed your waters and found the samples tested pure, with the exception of the first sample taken at the Finn Hotel, but carelessness in cleansing bottles, etc., might result in pollution at any time. Your attendant at the spring needs to be talked to and it should be a good thing for him to wear clean apparel used only by him when he is bottling water. This would constantly keep before him the necessity of cleanliness all around. New stoppers should be used every time a bottle is filled. These stoppers should be clean, of course, and your employe should be made to understand why this is necessary. Furthermore, all the bottles used in your business should be sterilized in some approved form before they are again filled with water.

Yours very truly,
(Signed) SAMUEL G. DIXON,
"Commissioner of Health."

9. SHAWNEE WATER.—The Shawnee Spring water is taken from an artesian well on the farm of Samuel Saltsburg, Plymouth Township, Luzerne County. It is bottled at a building provided for the purpose there and is supplied by Mr. Saltsburg to customers principally in Wilkes-Barre. The well is drilled 366 feet deep and is cased with 5 inch pipe to the rock 12 feet below the surface. The water flows from this pipe under pressure to the bottling house at 25 feet lower and 300 feet from the well, a 2 inch pipe line being used for the connection. The bottling house is a building 20 feet long and 12 feet wide with a cement floor. The 2 inch pipe terminates in a 5 inch header provided with three spigots, two for bottling purposes and one for hose connection used in washing, etc. The spigots have felt diaphragms through which the water passes. Surplus water is conducted by pipe outside of the buildings. Here it is used by the public, many miners in the vicinity having recourse to the water, which is free. Five gallon bottles are filled with the water from the faucets in the building. They are then crated and hauled by wagon to the distributing station at 127 South Main Street, Wilkes-Barre. Three wagons are employed in delivering the water to customers in the city. There is also a delivery wagon in Plymouth. About 200 coolers of the ordinary metallic and fibre stand type are furnished to the customers. In private families bottles adjusted in tipping crates are supplied. The empty bottles collected from the customers are hauled by wagon back to the bottling house at the farm. The washing and cleansing of the bottles is done at this place, not in the city. The cleansing operation is as follows: A tub large enough to hold one bottle is filled with water containing washing powder. The bottle is immersed in this tub and washed. It is then rinsed out in another tub of the same size, artesian water being used for the purpose, and finally it is again rinsed out and then the bottle is filled for re-shipment. A fresh cork stopper is used for each bottle. The old stoppers are destroyed. There is a boiler at the house for the purpose of heating water to faciliate the washing. The business is of recent establishment. The proprietor now purposes to erect a permanent building and equip it with modern apparatus. In the following table the results of the analyses of the water are given:

Shawnee Spring Water Analyses—1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
Aug. 25	At News office,	30	0
Sept. 8	At Poland Hotel,	10,800	16
8	At Exchange Hotel,	8	0
8	At bottling house,	8	0
8	At bottling house,	8	0
8	At bottling house,	6	0
21	At Wyoming Cafe,	4	0
21	At News office,	210	0

10. BECKER ARTESIAN WATER.—Two of the places using spring water examined by the Department were those of John J. Becker, farmer of Jackson township, Luzerne county, and proprietor of a restaurant and bakery at 18 East Market Street and at 32 West Market Street.

At the East Market Street restaurant there is a metal tank of about one-half barrel capacity. Ice is put into the water. The water is transported in milk cans from Mr. Becker's farm in Jackson township, and is supplied for table use to the customers. The cans were not properly cleansed. A sample of the water collected from a milk can was found to contain 12,000 bacteria and 75 B. Coli per c. c., whereupon the following notice was sent to the proprietor by the Commissioner of Health:

"August 29th, 1910.

"Mr. J. J. Becker,
No. 32 W. Market St.,
Wilkes-Barre, Pa.

"Dear Sir: A sample of water collected at your bakery and eating establishment, No. 18 East Market from a milk can in which the water was transported from your farm to the restaurant, so it is understood, has been analyzed by the State Department of Health and the water was found to be impure and unsuitable for public uses. You should at once boil all water obtained from the same source and transported in the same manner to your restaurant here in Wilkes-Barre and used for drinking purposes. Possibly the pollution of the water analyzed was due to the process of handling of the water either at the source or here in Wilkes-Barre. All the water containers should be thoroughly sterilized and the tanks and facilities with which the water is furnished to your customers should be thoroughly sterilized under the inspection and to the satisfaction of the officers of my Department under the immediate direction of Mr. F. Herbert Snow, Chief Engineer of the Department now stationed at Hotel Sterling.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

Becker Water Analyses—1910.

Date of collection.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
	Samples from Becker Restaurant, 18 E. Market St.		
Aug. 24	Milk can containing farm water,	12,000	75
30	Milk can containing farm water,	112,000	500
30	Milk can containing farm water,	6,500	150
30	Milk can containing farm water,	35.000	30
30	Tank cooler,	3,000	135
	Samples from Becker's Restaurant, 32 W. Market St.		
Aug. 30	Milk can containing farm water,	6,720	0
30	Tank, cooler,	1,050	0
	Samples from Becker's Farm.		
Aug. 30	Artesian well sampled at pump,	0	0
30	Spring sampled at home faucet,	46	0
30	Pond water supplied to stock,	90	0

Mr. Becker does not sell spring water. He ships about ten 40 quart cans of artesian water to his restaurants daily. The cans are those used in the milk business. They are hauled in by wagon from the farm together with milk, cream and vegetables. The water and milk cans are supposed to be cleansed and sterilized before being returned to Mr. Becker's farm, but these operations had been somewhat neglected.

Mr. Becker called at once in response to the Commissioner of Health's communication and explained that his farm milk is from registered stock in a healthy condition certified by a veterinarian. He said this milk and the cream produced there was not pasteurized but he would be glad to have this done if the Department required it. He offered to follow out any suggestion or instructions the Department had to offer for improving conditions at the farm or the restaurants or at the Wyalusing creamery and asked that inspections should be made at all of the farms producing milk and cream used by him. He said that he was selling by the glass two or three gallons only of milk daily, but that he was the largest ice-cream manufacturer in Wilkes-Barre.

The place at East Market Street—a bakery and eating establishment was without sterilizing apparatus. There is a metal ice tank with faucet which holds about one-half barrel of spring water. Ice is put into the water. The ice comes from Elk Lake Ice Company. The water is brought from Becker's farm in milk cans that were found dirty. The samples collected from the tank and the cans on August 30th all showed considerable pollution. One sample of milk and one of cream and one of vanilla ice cream taken September 5th were polluted.

Becker's Milk, Cream and Ice Cream Analyses—1910.
18 East Market Street.

Date of collection.	Sample.	Bacteria per c. c.	
		Total.	B. Coli.
Sept. 5	Milk from Wyalusing,	840,000	120,000
Sept. 5	Cream from Wyalusing,	1,512,000	120,000
Sept. 5	Vanilla ice cream,	1,900,000	90,000

The cans from which the samples were taken were dirty. The water was emptied out by the inspectors. Mr. Becker discontinued the use of the water until the cans and tank were sterilized. Prof. Dean was employed by Mr. Becker to go over both of his establishments. Steam sterilizing apparatus was installed. There was such a plant at 32 West Market Street. The cans were first cleansed with water containing a solution of borax; then they were rinsed with clean water and subjected to live steam for a period sufficient to destroy all bacterial life. These operations were supervised by Prof. Dean and a Department inspector.

At the West Market Street establishment the water used for table purposes is also brought from the farm in milk cans. The water sometimes remains in the cans for two days, unused. Finally it is poured from the cans into a large metal water tank in the restaurant. Around this tank is a brine cooler. The water is drawn by means of an ordinary faucet.

The ice cream is made in the basement of the building where the large refrigerating room is located. The bakery is also in the basement. The samples water collected from the tank and the milk can on August 30th did not show pollution; but samples of milk, cream and ice cream, given in the following table showed very high pollution:

Becker's Milk, Cream and Ice Cream Analyses—1910.
18 East Market Street.

Date of collection.	Sample.	Bacteria per c. c.	
		Total.	B. Coli.
Sept. 5	Milk from Wyalusing,	54,000	21,000
Sept. 5	Cream from Wyalusing,	3,350,000	216,000
Sept. 5	Cream (frozen) from Wyalusing,	1,350,000	225,000
Sept. 5	Milk (frozen) from Wyalusing,	200,000	26,200
Sept. 5	Vanilla ice cream,	4,320,000	1,080,000

The steam sterilizing plant is in the cellar. The same instructione relative to cleansing and sterilizing the tank were given here as at the other place and the work was done in the presence of Department inspectors.

The artesian well at the farm is about 100 feet deep and the water rises in the pipe to within about 20 feet of the surface. There is a wooden platform and a hand pump adjusted over the pipe. The cans are filled with water at this pump. Seventy feet distant there is a pig pen. The slope of the ground is away from the platform at the pump.

There is a spring on the farm. It is enclosed by concrete masonry and covered by a roof. The flow is weak and insufficient to supply the farm house and the restaurants, so it is utilized for household purposes only. A pipe conducts the water by gravity to the dwelling. Formerly, this was the source of supply to the restaurant; but it was too unhandy and limited in quantity; so Mr. Becker drilled a well.

There is a second spring 60 feet north of the house. It is concreted around and closed up and has a pipe leading therefrom to the barn. This water is furnished to the cattle and also to the milk shed for cooling purposes; but on the first of September the spring was dry so water was being hauled from a pond on the premises and supplied to the stock. Only artesian well water was being used at the milk house. Hot water is brought from the dwelling for cleansing the milk utensils. The samples of water collected at the farm, appearing in a premious table herein, showed no pollution at these sources of supply.

Examination of Private Wells.

Whenever it was reported that a typhoid fever patient had used private well or spring water, the source of supply so reported was investigated by the Department. In the following table are given the results of the analyses of samples collected from these supplies:

Private Well and Spring Water Analyses—1910.
Date of Collection—August 25th.

Samples and Remarks.	Bacteria per c. c.	
	Total.	B. Coli.
1 Smith well behind Hazel school house,	280	0
2 Houck well, 234 McLean street,	3,600	0
3 Couch well, 197 Daisy Lane,	170	24
4 Burns well at Parsons borough,	26	0
5 Boulevard spring (a) at 1st toll house,	170	30
6 Boulevarde spring (b) 200 yards north of (a),	36	1
7 Boathouse spring (a) on river bank N of B house,	18	0
8 Boathouse spring (b) on river bank S of B house,	56	0
9 City Hospital spring, North River street wall,	40	0
10 Gimber well, 570 N. Main street,	1,800	10
11 Irwin well, 522 N. Main street,	200	0
12 Thomas well, 110 Blackman street,	130	8

Three wells and two springs were found polluted. Several families used the Couch well water. Boulevard Spring (A) is at the road side. It is used extensively by pedestrians. Spring (B) is located out in the field and is used by six Hungarian families among whom no typhoid existed. The Gimber well water was used by the family only with a few exceptions. Two years ago it was closed against public use by the City Health Department. Twenty-five families used the Thoma well water. On September 1st, Mr. Morgan of the Sanitary Committee was notified that the samples of water from these 3 sources in the city showed, upon analyses, the pollution by sewage organisms and that the use of the water should be discontinued. The city placarded the places and closed them from public use.

The physical conditions at the Boathouse spring were such that the proprietor of the boathouse was ordered to dispense with the drinking cups that he kept there for the convenience of his patrons. The springs were placarded but they could not be closed. The water flows out from the foot of the river embankment over the rim of a vitrified tile pipe set vertically in the ground with the top just above the level of the ground round about. A few feet distant at the waters edge of the river sewage pollution was evident to the eye and solid matter had become stranded on the shore. The use of these springs was eventually stopped.

Dr. Barton of the Board of Health of Plains township was notified of the pollution of the Boulevard spring and he agreed to see that they were properly protected or closed.

Examination of the Ice Supplies.

Eight ice-dealing concerns were investigated. They are named in the following table:

1. Wilkes-Barre Cold Storage & Artificial Ice Co.
2. Fenner, John W., 18 Ross St., Ashley.
3. Ganoga Ice Company.
4. Heart Lake Ice Company.
5. Mountain Lake Ice Company
6. Mountain Ice Company.
7. Pocono Ice Company.
8. Spring Lake Ice Company.

There was no known connection and none suspected between the city ice supply and the typhoid fever outbreak. The companies investigated comprise the general ice supply to the city.

1. WILKES-BARRE COLD STORAGE & ARTIFICIAL ICE COMPANY.—The ice is manufactured from water derived from two drilled well on the premises. A large part of the product is used at the cold storage plant. Six to eight tons only each day are sold to consumers. They carry it from the plant.

2. FENNER, JOHN W.—He obtains his ice from the head waters of the Lehigh River. A sample analyzed by the Department showed the ice to be pure and this is true with respect to the samples analyzed of all of the dealers.

3. GANOGA ICE COMPANY.—The ice supply comes from Lake Ladore, Wayne county and from lakes at Gouldsboro. The company buys some ice from Albert Lewis Lumber Company.

4. HEART LAKE ICE COMPANY.—This company's supply is purchased from the Mountain Ice Company and from Albert Lewis Lumber Company.

5. MOUNTAIN LAKE ICE COMPANY.—This ice supply comes from an artificial lake at Alderson. It is shipped over the Lehigh Valley Railroad to Wilkes-Barre and sold to consumers and small dealers from the car. Four ice wagons deliver the ice product around the city.

6. MOUNTAIN ICE COMPANY.—This company gets its supply from lakes around Gouldsboro and from Tobyhanna.

7. POCONO ICE COMPANY.—This supply comes from Bear Creek and from Bean Run.

8. SPRING LAKE ICE COMPANY.—These dealers purchase their supply from the Trout Lake Ice Company. The latter concern harvests ice from a lake in the Pocono Mountains.

Ice Analyses—1910.

Date of collection	Sample.	Bacteria per c. c.	
		Total	B. Coli.
Aug. 24	Wilkes-Barre Ice Company, 150 N. Main,	210	0
Sept. 5	Artificial Ice Company,	4	0
Sept. 5	Fenner, John W., Ashley,	8	0
Aug. 24	Ganoga Ice Company, 18 Scott street,	8	0
Aug. 24	Heart Lake Ice Co., 33 N. Penna.,	80	0
Aug. 25	Mountain Lake Ice Company,	2	0
Aug. 24	Pocono Ice Company,	26	0
Sept. 5	Pocono Ice Company,	6	0
Aug. 24	Spring Lake Ice Co.,	840	0

d. Typhoid Fever Cases of Obscure and Unknown Origin.

Thirty-three cases of typhoid fever of obscure and unknown origin have been hereinbefore described in connection with milk. There remain 7 other such cases not connected with milk. They are shown in the following table:

Miscellaneous City Typhoid Fever Cases of Obscure and Unknown Origin—1910.

Date of onset.	Patient.	Age.	No. in family.	Employment.
Aug. 16	Ed. Garrahan, 261 Moyallen St.,	40	7	Laborer.
Aug. 17	Chas. Eckhart, 147 Brown St.,	46	10	Mason.
Aug. 19	Mrs. W. E. Harding, 19 Harrison St.,	26	5	At home.
Aug. 20	Mrs. Rose Kornfeld, 65 N. Hancock St.,	15	6	At home.
Aug. 21	Wm. Holdsmith, 27 Oregon,	23	5	Machinist.
Sept. 3	Mrs. Frank Seblnsky, 754 N. Penna. Ave.,	25	5	At home.
Sept. 13	Mrs. Geo. Rekus, 138 S. Meade St.,	38	10	At home.

Mr. Kornfeld kept his own cow. His wife handled the milk and sold to the neighbors. The premises were in a filthy condition. The owner would not clean up. It had to be done by the city officer. The sale of milk was ordered stopped but the order was not obeyed. The proprietor was arrested. Subsequently an officer was stationed on the property to see that the milk was not sold. The owner had to be threatened with a severer punishment. The patient would not go to the hospital. The family had to be put under quarantine.

Cases Not Typhoid Fever.

Two reported cases of typhoid fever have been previously described as not typhoid. There remain two cases to be described.

Miscellaneous City Typhoid Fever Cases Reported That Were Subsequently Determined Not Typhoid.

Date of onset.	Patient	Age.	No. in family.	Employment.
July 28	Arthur Lewis, 475 E. Market St.,	13	5	At home.
Sept. 16	Anthony Lawrence, Hotel Hinchle,	26	------	Collector.

Garbage and Night Soil Disposal.

The city has a contract with the Bennett Garbage Disposal Company under which the company has the exclusive right to maintain a garbage incinerating plant within the city for a limited period. The agreement permits the collection and transfer of garbage through the city streets and regulates the charges upon the householder for collection and disposal of the garbage. The business must be conducted satisfactory to the Sanitary Committee of Councils. By city ordinance the term garbage is defined. The company provides separate cans, one for garbage and one for ashes. There are about 4,000 of these cans in service. Full cans are removed and in their place are left clean cans, which have been previously washed with hot water and soda and deodorized with a creolin compound at the disposal plant, the crematory is located in South Wilkes-Barre.

The city ordinance is not rigidly enforced. There are a number of individuals engaged in the collection and removal of garbage. Occasionally arrests have been made, but the practice continues. The private collectors dump the garbage at five places. Three of these dumps are maintained by the city for ashes and other non-putrescible wastes. One is near Academy and River streets, one on No.— Pennsylvania Avenue and one on Coal Street. At the two first mentioned places, city employes are stationed to regulate the character and disposition of refuse.

Near the Academy Street city dump there is a private one known as Farrell's dump. Some garbage is deposited here and .little attention is given to covering it. The other private dump is in Dorranceton on the west bank of the river below the city park. Most of the waste is the other than garbage. An attendant is in charge and a 10 per cent. solution of carbolic acid is sprinkled over the most offensive refuse and care is taken to cover all putrescible matter.

A detailed investigation was made into the methods employed in the collection and disposal of the contents of cesspools and privies in Wilkes-Barre and neighboring municipalites. Wilkes-Barre, Edwardsville, Plymouth and Nanticoke are the only towns in which permits for this work are required and in the latter two a nominal fee is charged. The greater part of this work is done under the direction of one man who is licensed to do business in Wilkes-Barre and is known as the city scavenger. The liquid contents of cesspools are removed by means of Nobles excavating pump with a sixteen barrel wooden tank, while solids are transported in standard covered excavating barrels with a capacity of 4 cubic feet. These barrels are provided with iron cover, rubber gasket and in addition a gasket of wet newspapers is employed. Before removal from the premises, the barrels are cleansed in the exterior with water, and a disinfecting solution. During the process of excavation a canvas curtain is drawn about the privy and burning tar used for fumigation. On completion of the work the premises are disinfected with carbonate of lime or if in bad condition with crude carbolic acid. On properties where contagious diseases are known to have occurred carbolic acid and formaldehyde or both are used before and during excavation, so it is reported. During the current season, night soil has been disposed of at three dumping grounds. Generally speaking, all north of Market Street has been taken to a farm in Plains township near Port Bowkley; all south of Market Street to the farm of Milton Blodgett in Hanover township near Breslau; all west of the river to the Davis truck farm in Kingston township. Normally the method employed in the distribution is to deposit the night soil in furrows ploughed about 4 feet apart in land which is not to be used for agricultural purposes during that year. Immediately or soon thereafter it is covered with from 3 to 6 inches of earth and is allowed to remain until the close of the season or the next spring, and then ploughed under. At the Port Bowkley dumping ground and at the Blodgett Farm in Hanover Township this method of procedure is approximately followed and the products raised upon the ground are grains. At the Davis Farm this is far from the case. The land used there is a strip about 400 feet wide and approimately 1,400 feet long divided transversely into a series of 14 patches or stretches of varying width. Some of these patches are used during the year, as dumping ground while on the others various kinds of vegetables are grown. In the succeeding year the portion used as a dumping ground is used for growing vegetables. At the time of the investigation the following products were being raised and gathered: rhubarb, tomatoes, cucumbers, sweet corn, beans, beets, cabbage, celery and oats. In some cases, notably in a cucumber patch, there still remained clear evidence of the night soil which had previously been ploughed under. A 16 barrel tank of liquor had been dumped close to the margin of a tomato bed and a portion of the contents had run over onto the growing veretables and destroyed some of the plants. Tomatoes were being gathered close up to the margin of this area. Within 3 feet of the margin of this same bed of growing produce a furrow had been ploughed and night soil deposited therein. Other instances of dangerous methods were also noted at this farm. The produce from the Davis farm is sold for the most part in the public market of Wilkes-Barre.

From May 1st, to September 10th, the work of the city scavenger in Wilkes-Barre included the cleaning of privies and cesspools at 77 properties and permits have been issued for 13 properties at which the work has not yet been done. Thirty-eight of the seventy-seven were cleaned and the vaults filled in with earth and abandoned by reason of new house connections to the street sewers.

At Laurel Run borough there are cleaned once a year 15 privies and 3 cesspools belonging to the Dupont-Denumours Powder Company, 10 privies on Oliver properties and 2 at the school house. The contents are removed to a vault or sump provided by the powder company near the top of the mountain about one-half mile from Pine Run. The same is 8 feet square and 5 feet deep with walls of loose stone. The night soil is placed in layers about 1 foot thick each covered with a layer of quick lime. At the time of the Department's inspection the sump was practically full and a second similar sump about 25 feet distant is filled to a depth of about one foot. A careful inspection failed to reveal any danger of pollution of the city's water supply by reason of these sumps.

The growing of vegetables and especially those which come in contact with or close to the ground on soil fertilized with the contents of privies and cesspools is clearly an extremely dangerous practice and the local health authorities were advised to take the necessary steps to prevent the sale to the public of vegetables so grown.

Most of the properties on which typhoid fever occurred during the summer, were connected to the public sewers. In one case only was there a privy, for the cleaning of which the city scavenger took out a permit. In this case the excreta were carted out into the country and after thorough disinfection, were properly buried in the ground. The scavenger had instructions to do this in all cases where there has been typhoid fever on the property.

3. Summary of City Typhoid Cases.

There were 149 cases in the city of Wilkes-Barre during the period covered by the Department's inspection. A summarized statement of these cases is given in the following table:

Concluding Classification of City Typhoid Fever Cases During Summer Outbreak.

Origin or medium of transmission		Number of cases attributed.
Milk,		74
Direct,	63	
Secondary,	11	
Water,		19
Vulcan Spring,	9	
Mine Water,	1	
River—boating, bathing and washing,	9	
Secondary (to other than milk),		6
Imported,		6
Obscure and unknown,		40
Not typhoid fever,		4
Total actual cases,		149

Part V.—Typhoid Fever in Wyoming Valley, and Measures Taken to Suppress the Same.

There were 149 cases of typhoid fever in Wilkes-Barre city. Besides this number there were 150 additional cases in the Wyoming Valley distributed throughout 20 boroughs and 7 townships and Pittston city. Each one of these local outbreaks was a danger spot made particularly so because of uncleanly surroundings, lack of maintenance of sanitary standards and the absence of organized boards of health in most cases. These foci of infection imperiled the health of the public in Wilkes-Barre and throughout the valley. There were other towns and boroughs in the chain of municipalities in the valley where similar conditions existed, but where typhoid fever did not break out. The work of suppressing a spread of the infection and of confining the contagion to the households afflicted was performed by the Department officers aided by the local health officer appointed by the Commissioner of Health and by the town officials.

The same methods were pursued in this territory that obtained in Wilkes-Barre except that in most instances, there being no municipal health board or officers, the work developing entirely upon the Commissioner of Health and his field staff. This work had to go on simultaneously with that of Wilkes-Barre. As would have been expected, secondary infection predominated. The wonder is that the the outbreak was suppressed. One circumstance operated to aid in the suppression and that was the widespread alarm among the citizens of the valley.

1. Distribution of Typhoid Fever Cases by Municipalities in the Wyoming Valley Excluding Wilkes-Barre, Summer 1910.

Between July 1st and October 1st.

Place.	Number of Cases,					
	Obscure unknown.	Milk.	Secondary	Imported.	Miscellaneous.	Total.
Ashley borough,	1	0	1	0	0	2
Avoca borough,	3	8	1	0	0	12
Dorranceton borough,	2	0	2	2	0	6
Duryea, borough,	1	1	0	0	0	2
Edwardsville borough,	5	0	2	0	0	7
Forty Fort borough,	2	0	0	0	0	2
Hanover township,	3	0	1	1	0	5
Jenkins township,	5	0	0	0	0	5
Kingston borough,	1	0	1	3	0	5
Kingston township,	2	0	3	0	1	6
Larksville borough,	2	0	6	0	0	8
Luzerne borough,	2	0	9	1	1	13
Miners Mills borough,	1	0	1	0	0	2
Moosic borough,	1	4	0	0	0	5
Nanticoke borough,	2	0	0	0	0	2
Newport township,	2	0	0	0	0	2
Old Forge borough,	3	3	0	0	0	6
Parsons borough,	9	0	5	0	0	14
Pittston city,	0	1	2	1	3	7
Plymouth borough,	4	0	2	2	0	8
Sugar Notch borough,	1	0	1	0	0	2
Swoyersville borough,	4	0	5	0	0	9
Warrior Run borough,	0	0	3	0	0	3
Wilkes-Barre township,	1	0	0	0	0	1
Wyoming borough,	1	0	1	0	0	2
Total in Water District,	58	17	46	10	5	136
Lake township,	3	0	0	0	0	3
Dallas borough,	0	0	0	1	0	1
Ross township,	0	0	8	2	0	10
Total outside water district,	3	0	8	3	0	14
Gand total	61	17	54	13	5	150

The ten cases in Ross township are attributed to Wilkes-Barre. Nine occurred in the settlement called Sweet Valley and one at Broadway several miles distant. This latter case was a woman. She came home from Wilkes-Barre, where she had been visiting for several weeks, feeling ill and the case developed into typhoid.

The Sweet Valley cases were secondary to that of a man employed on the farm of Callender. If reports can be credited, he contracted the disease in Wilkes-Barre. He was ailing for two weeks at the farm before the doctor diagnosed the case as typhoid fever. Subsequently his wife and three neighbors living opposite—visited back and forth—came down with the disease, all about the same time. The son of a co-laborer at the farm who visited in the home of the original case during the first part of the patient's sickness was stricken and also the wife of a co-laborer who was a neighbor. Two other neighbors, both hucksters in farm products also contracted the disease, all within a month of the first case.

Mrs. Nixon and her daughter visited at Sweet Valley for two weeks and spent most of the time with the people who subsequently were stricken with typhoid. She returned home to Kingston borough on August 23rd and on September 1st, the daughter came down with typhoid. Mrs. Nixon contracted the disease nearly three weeks later through nursing her daughter.

William Frailey went to his home in Dallas borough from a visit to the Hunsinger family in Wilkes-Barre and came down with typhoid fever shortly afterwards. Another case exported from Wilkes-Barre was that of Dr. Thomas J. Dailey of Plymouth. He had attended several cases of typhoid fever at the Mercy Hospital and assisted at post mortem examinations.

In Avoca, Duryea, Moosic and Old Forge boroughs there were 25 cases of typhoid fever between the dates of June 10th and August 27th, 16 of which were supplied by one dairyman, the other cases didn't use milk. The June 10th case was of the ambulatory type. During the first week in July along the dairyman's milk route, four cases developed among the customers. The week following five other persons came down with the disease among the customers. The physicians very generally suspected the milk. The Department could find nothing at the farm of the producer to warrant the conclusion but it was possible the infection to have been handed along bl the driver of the milk wagon. The houses were not placarded until late and although secondary infection did not follow in the homes, the Department was inclined to give some credence to the milk theory. It was claimed by the families afflicted that the driver of the wagon had the disease in ambulatory form. This man would not submit to a blood test. He had typhoid fever three years before. Thorough instructions relative to the care of the patients, disinfection of the stools, protection from flies and cleaning up of the properties were given by the inspectors who saw to it that the regulations were followed. A general cleaning up in the town was ordered.

Avoca had no board of health or health officer. In Duryea typhoid cases were not reported nor placarded. The board of health was inactive. Old Forge was without a board of health and in Moosic borough the board of health did not hold meetings nor was the board organized owing to lack of an appropriation to do work, houses were not placarded nor premises upon which infections and contagious diseases occurred, disinfected.

There were 13 cases in Luzerne borough. Mike Marsy contracted typhoid fever from unknown origin on June 20th. Subsequently in the same house five other cases developed. the dates being July 21st, two on August 23rd, one on September 8th, and one on September 10th. James Trenaga contracted typhoid fever probably at a nearby resort. His onset was July 25th. Subsequently in his home four other cases occurred, the dates being as follows: August 28th, September 19th. 24th and 25th. John Lindsay's case was imported from White Haven. The origin of the remaining case is unknown.

The attempts to trace the origin of the cases in Parsons borough was not very successful Five were unquestionably of secondary origin. It was easy to speculate with respect to the other cases.

In the Durkin family three cases came down about the same time, the fourth was secondary without doubt. The property was not placarded and a trained nurse was employed.

Mike Yesvata, aged 14, contracted typhoid fever from some unknown origin. His neighbors and constant playmates, Sarah, William and James Smith came down with the disease on September 4th, 6th and 8th respectively and on the 10th, his playmate Frank Brogan was stricken.

Of the five remaining unknown cases respecting origin, two were children who did not go around any, one was an aged person, one was a young man who frequented the parks and the other was a woman who did house work at home for a family of ten. She had given birth to a child on August 7th. The doctor was called in to treat the typhoid case which was well developed on August 7th. The day following Mrs. Skura died. These cases are examples of the obscurity of the origin of a large number of patients, whose history the Department officers tried to trace. Numbers of cases, in fact a large majority were reported very late and the members of the family apprehending possible consequences of admitting the truth did not welcome the investigator and wilfully withheld information.

In the Wyoming Valley there are 41 municipalities comprising the cities of Pittston and Wilkes-Barre; the first class townships of Lackawanna, Plain, Wilkes-Barre, Plymouth and Newport; the second class townships of Jenkins Kingston, Pringle and Hanover; and the boroughs of Taylor, Old Forge, Moosic, Avoca, Duryea, Hughestown, West Pittston, Exeter, Wyoming, West Wyoming, Yatesville, Laflin, Miners Mills, Parsons, Laurel Run, Dorranceton, Forty-Fort, Swoyersville, Kingston, Dallas, Edwardsville, Luzerne, Courtdale, Larksville, Plymouth, Ashley, Sugarnotch, Warriors Run and Nanticoke.

In Old Forge, Moosic, Avoca, Duryea, Laurel Run and Dallas there were no organized boards of health. Excepting Laurel Run there were typhoid fever cases in these places. The latter part of August, new cases were coming to light every day. In other places the boards of health were not active; their ordinances, rules and regulations were inadequate, appropriations were insufficient and in not a few of the municipalities the boards were not organized. In consequence, the Commissioner of Health issued the following notice on September 1st, through the newspapers and by sending a copy to each municipality:

"Commonwealth of Pennsylvania, Department of Health
Harrisburg, Sept. 1st, 1910.

"2. Order—To the Local Authorities of the Municipalities in Wyoming Valley:

"Your attention is hereby specifically called to the conditions now existing in and about the Wyoming Valley. Contagious and infections diseases are prevalent and the public health is imperiled.

"In some municipalities in the valley the authorities have been utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such board. In some instances these Boards of Health are inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties, or both.

"It is imperative that in each of the municipalities and townships in the valley immediate steps shall be taken to stamp out these infections and contagious diseases and to prevent their recurrence in epidemic form.

"The crisis is so important that it becomes necessary for the State Departmeant of Health to enjoin upon the local authorities of said municipalities and townships the fulfillment of the laws of the Commonwealth relative to the formation of Boards of Health and the proper execution of the sanitary laws of the State. Unless the authorities of any and every municipality where a Board of Health is not organized or where the sanitary laws are not being executed, proceed immediately to fulfill the laws of the Commonwealth respecting these matters, I shall put the case in the hands of the Attorney General to take legal compulsory measures.

"Officers of the State Department of Health will give you instructions relative of the things to be done at once at property on which typhoid exists or has occurred, if there be any such property in your territory. Dr. Chas. H. Miner, of Wilkes-Barre, County, Medical Inspector for Luzerne County, or Dr. J. C. Reifsnyder, of Scranton, County Medical Inspector for Lackawanna County, will give instructions about organization and rules and regulations under which the Board of Health will operate. The Department's legal representative will communicate with the attorney of each municipality in the valley.

SAMUEL G. DIXON,
"Commissioner of Health."

The following is a copy of a letter sent to the burgess and town council of Old Forge, Moosic, Avoca and Duryea boroughs on September 2nd by the Commissioner of Health:

"Gentlemen: There are a number of typhoid fever cases in your borough. These cases are not placarded and nothing is being done by the local authorities to prevent a spread of the infection. So far as we are able to ascertain there is no organized Board of Health in Old Forge Borough, or if there be a Board of Health in this borough it is not active and discharging the duties imposed by law upon it. It becomes my duty to notify you that the laws of the Commonwealth relative to the appointment of a Board of Health and relative to the enforcement of sanitary precautions, must be put into effect immediately. Your attention is specifically called to the conditions now existing in and about the Wyoming Valley. Contagious and infectious diseases are prevalent and the public health is imperiled.

"In some municipalities in the valley the authorities have been utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such a board. In some instances these Boards of Health are inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties, or both

"It is imperative that in each of the municipalities and townships in the valley immediate steps shall be taken to stamp out these infections and contagious diseases and to prevent their recurrence in epidemic form.

"The crisis is so important that it becomes necessary for the State Department of Health to enjoin upon the local authorities of said municipalities and townships the fulfillment of the laws of the Commonwealth relative to the formation of Boards of Health and the proper execution of the sanitary laws of the State. Unless the authorities of any and every municipality where a Board of Health is not organized or where the sanitary laws are not being executed, proceed immediately to fulfill the laws of the Commonwealth respecting these matters, I shall put the case in the hands of the Attorney General to take legal compulsory measures.

"You must immediately organize an efficient Board of Health. provide ample funds and take measures necessary to regulate and control infectious and contagious diseases. Officers of my department will give you instructions relative to the things to be done at once at property on which typhoid fever exists or has occurred. You must placard all cases of infectious and contagious diseases and carry out the instructions which will be given you. Dr. J. C. Reifsnyder, of Scranton, County Medical Inspector for Lackawanna County, will give you instructions about the organization of your Board of Health and with respect to the rules and regulations under which the Board of Health will operate. In the meantime active measures must be enforced at the properties whereon typhoid fever exists.

"Enclosed you will please find a copy of the rules to be observed in the care and management of cases of typhoid fever. Thes rules you must enforce forthwith.

"I have placed in the hands of the Department's attorneys, Messrs. Atherton & Jones, of Wilkes-Barre, the matter of the non-observance by your borough of the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations. These attorneys will further communicate with you and you must perfect your organization to their satisfaction and the satisfaction of Dr. Reifsnyder, subject to my final approval

"Yours very truly,

(Signed) "SAMUEL G. DIXON,

"Commissioner of Health."

Dr. Miner was notified that Inspectors Teats and Miller were stationed at Avoca and Duryea and were instructing a provisional health officer about what to do on property where typhoid fever existed, until this local officer should receive further instructions from the county medical inspector. Dr. J. C. Reifsnyder. of Scranton, the Department's County Medical Inspector for Lackawanna County, was similarly notified with respect to the boroughs of Moosic and Old Forge. Taylor borough in Lackawanna County, received the following communication from the Commissioner of Health, and with respect to it, Dr. Reifsnyder was advised as follows:

"There is a board of health in Taylor borough we understand, but it may be inactive, owing to lack of funds. The board may not be reporting promptly cases of typhoid fever. Furthermore, the ordinances may not be of the approved type, milk dealers may not be licensed, and the board may not be enforcing proper regulations about milk and other matters where there is contagious or infectious disease. It is good time now to consult with them and improve the service all along the line. Inspectors Teats and Miller have talked with the burgess of Moosic and Old Forge and will tell the health officer to be appointed about practical remedies to be applied at once where there is typhoid. We know of no case in Taylor borough."

"Gentlemen: I wish to inquire if there are any typhoid fever cases in your borough and if it is your custom to placard infectious and contagious diseases and to do those things necessary to prevent a spread of the infection. Furthermore, I wish to inquire if you report infectious and contagious diseases to the Commissioner of Health. If there is an organized Board of Health in Taylor borough you are requested to immediately inform Dr. J. C. Reifsnyder, of Scranton, County Medical Inspector for Lackawanna County, of the fact and give the names of the President and Secretary and other members of the board and the name of the health officer.

"It becomes my duty to notify you that the laws of the Commonwealth relative to the appointment of a Board of Health and relative to the enforcement of sanitary precautions must be put into effect in all of the municipalities throughout the Wyoming Valley. Your attention is specifically called to the conditions now existing in and about the Wyoming Valley. Contagious and infections diseases are prevalent and public health is imperiled.

"In some municipalities in the valley the authorities have been utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such a board. In some instances these Boards of Health are inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties, or both.

"It is imperative that in each of the municipalities and townships in the valley immediate steps shall be taken to stamp out these infectious and contagious diseases and to prevent their recurrence in epidemic form.

"The crisis is so important that it becomes necessary for the State Department of Health to enjoin upon the local authorities of said municipalities and townships the fulfillment of the laws of the Commonwealth relative to the formation of Boards of Health and the proper execution of the sanitary laws of the State. Unless the authorities of any and every municipality where a Board of Health is not organized or where the sanitary laws are not being executed, proceed immediately to fulfill the laws of the Commonwealth respecting these matters, I shall put the case in the hands of the Attorney General to take legal compulsory measures.

"If you do not have a Board of Health you must immediately organize an efficient Board of Health, provide ample funds and take measures necessary to regulate and control infectious and contagious diseases. Dr. J. C. Reifsnyder will give you all necessary instructions with respect to organization and with respect to rules and regulations under which the Board of Health will operate.

"I have placed in the hands of the Department's attorneys, Messrs. Atherton & Jones, of Wilkes-Barre, the matter of the non-observance by the several boroughs of the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations. These attorneys will further communicate with you about the perfecting of your Board of Health organization and the work to be accomplished thereunder.

"Yours very truly,
(Signed) "SAMUEL G. DIXON,
"Commissioner of Health."

To the burgess and town council of Laurel Run and Dallas boroughs, the following communication was sent on September 3rd by the Commissioner of Health:

"Gentlemen: So far as we are able to ascertain there is no organized Board of Health in Laurel Run borough, or if there be a Board of Health it is not active and discharging the duties imposed by law upon it.

"It becomes my duty to notify you that the laws of the Commonwealth relative to the appointment of Boards of Health and relative to the enforcement of sanitary precautions, must be put into effect immediately. Your attention is specifically called to the conditions now existing in and about the Wyoming Valley. Contagious and infectious diseases are prevalent and the public health is imperiled.

"In some municipalities in the valley the authorities have been utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such a board. In some instances these Boards of Health are inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties, or both.

"It is imperative that in each of the municipalities and townships in the valley immediate steps shall be taken to stamp out these infectious and contagious diseases and to prevent their recurrence in epidemic form.

"The crisis is so important that it becomes necessary for the State Department of Health to enjoin upon the local authorities of said municipalities and townships the fulfillment of the laws of the Commonwealth relative to the formation of Boards of Health and the proper execution of the sanitary laws of the State Unless the authorities of any and every municipality where a Board of Health is not organized or where the sanitary laws are not being executed, proceed immediately to fulfill the laws of the Commonwealth respecting these matter, I shall put the case in the hands of the Attorney General to take legal compulsory measures.

"You must immediately organize an efficient Board of Health, provide ample funds and take measures necessary to regulate and control infectious and contagious diseases. You must placard all cases of infections and contagious diseases and carry out the instructions which will be given you. Dr. Chas. H. Miner, of Wilkes-Barre, County Medical Inspector for Luzerne County, will give you instructions about the organization of your Board of Health and with respect to rules and regulations under which the Board of Health will operate.

"Enclosed you will please find copy of rules to be observed in the care and management of cases of typhoid fever.

"I have placed in the hands of the Department's attorneys, Messrs. Atherton & Jones, of Wilkes-Barre, the matter of the non-observance by your borough of the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations. These attorneys will further communicate with you and you must perfect your organization to their satisfaction and the satisfaction of Mr. Miner, subject to my final approval.

"Yours very truly,
(Signed) "SAMUEL G. DIXON,
"Commissioner of Health."

On September 2nd the following letter was sent by the Commissioner of Health to the mayor and city councils of Pittston. In this place the doctors were not reporting typhoid fever cases, and the conditions with respect to sanitation where typhoid existed in most places were horrible. Inspectors Templeton and Fredericks were stationed there to assist the city health officer. The city board of health was willing to act but had no funds. On request of the Mayor and by direction of the Commissioner, Dr. Miner and Mr. Snow conferred with the Mayor and councils about the adoption of a new health ordinance. The change was finally effected. Subsequently the Commissioner notified the Mayor and the president of the Board of Health that the milk supply of Pittston had been investigated sufficiently to indicate that a thorough change in the manner in which milk is received and handled at the restaurants, hotels and eating places should be brought about.

"Gentlemen: There are a number of cases of typhoid fever in the City of Pittston which are not being reported to the local Board of Health and hence are not being placarded and in consequence little or nothing is being done to stop the spread of this infection. Unless prompt measures be taken your city may be in the throes of a wide spread epidemic. It becomes my duty to notify you that the laws of the Commonwealth relative to the enforcement of sanitary precautions must be put into effect immediately. Your attention is specifically called to the conditions now existing in and about the Wyoming Valley. Contagious and infectious diseases are prevalent and public health is imperiled.

"It is imperative that immediate steps shall be taken to stamp out these infectious and contagious diseases and to prevent their recurrence in epidemic form, and the crisis is so important that it is necessary for the State Department of Health to enjoin upon the authorities of your city the promptest fulfillment of the sanitary laws of the Commonwealth.

"You are requested to at once provide ample funds to enable your Board of Health to take the necessary measures to regulate and control the typhoid fever situation. Officers of my Department will give the Board of Health instructions relative to the things to be done at once at property on which typhoid fever exists or has occurred in your city. All cases of infections and contagious diseases must be placarded and reported. Copies of rules and regulations to be observed in the care and management of cases of typhoid fever have been placed in the hands of the President of your Board of Health.

"Yours very truly,
(Signed) "SAMUEL G. DIXON,
"Commissioner of Health."

To the Burgess and Town Council, of Plymouth, Larkesville, Courtdale, Luzerne and Edwardsville, the following communication was sent by the Commissioner of Health on September 5th:

"Gentemen: I wish to inquire if there are any cases of typhoid fever in your borough and if it is your custom to placard infections and contagious diseases and to do those things necessary to prevent a spread of the infection. I am making this general inquiry of all the boroughs in the valley. Furthermore, I wish to inquire particularly if you report infections and contagious diseases to the Department. You are requested to immediately inform Dr. Chas. H. Miner, of Wilkes-Barre, County Medical Inspector of Luzerne County, the name of the President and Secretary and members of your Board of Health and the name of the health officer and send him a copy of your rules and regulations and ordinances under which you operate. I am notifying you in common with all other local authorities in the valley that the laws of the Commonwealth relative to the appointment of a Board of Health and relative to the enforcement of sanitary precautions must be put into effect in all of the municipalities throughout the Wyoming Valley. Your attention is specifically called to the conditions now existing in and about the Wyoming Valley. Contagious and infectious diseases are prevalent and public health is imperiled.

"In some municipalities in the Wyoming Valley the authorities have been utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such a board In some instances these Boards of Health are inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties, or both.

"It is imperative that in each of the municipalities and townships in the Valley immediate steps shall be taken to stamp out these infections and contagious diseases and to prevent their recurrence in epidemic form.

"Your Board of Health should hold regular meetings and keep proper minutes thereof and the Council should provide ample funds to enable the Board to take measures necessary to regulate and control infectious and contagious diseases. The ordinances, rules, and regulations in relation thereto should be all right. Dr. C. H. Miner will confer with you with respect to your organization and with respect to the rules and regulations under which the Board of Health will operate.

"As a matter of information I beg further to state that I have placed in the hands of the Department's attorneys, Messrs. Atherton & Jones, of Wilkes-Barre, the matter of the non-observance by several boroughs of the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

To the President of the Board of Health of Ashley and Nanticoke Boroughs, the following communication was sent on September 6th. It is followed by a copy of a letter sent to the Commissioners of Pymouth Township:

"I am informed that you have a thoroughly organized and efficient Board of Health and that you are active in handling infections and contagious diseases and in carrying out the laws of the State relative to sanitation. I wish you would at this time send to Dr. Chas. H. Miner, of Wilkes-Barre County Medical Inspector for Luzerne County, a copy of your rules and regulations and ordinances under which the Ashley Board of Health operates. This is an auspicious time for changes to be made in Board of Health ordinances. Furthermore, contagious and infectious diseases should be promptly reported.

"In some municipalities in the Valley the authorities have been utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such a Board. In some instances these Boards of Health are inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties or both.

"It is imperative that in each of the municipalities and townships in the Valley immediate steps shall be taken to stamp out these infections and contagious diseases and to prevent their recurrence in epidemic form and your co-operation is requested.

"Enclosed you will please find copy of a general letter which I have sent out to the municipal authorities, also a copy of rules to be observed in the care and management of cases of typhoid fever.

"And finally for your general information I beg to say that I have placed in the hands of the Department's attorneys, Messrs. Atherton & Jones, of Wilkes-Barre, the matter of the non-observance, by several boroughs of the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations. It appears, however, that at this time there will be no necessity for prosecution in the delinquent boroughs because of immediate and earnest activity on the part of the local authorities to organize and carry out instructions.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

"I wish to inquire if you report promptly infectious and contagious diseases to the Department You will please immediately inform Dr. Chas. H. Miner, of Wilkes-Barre, County Medical Inspector for Luzerene County, the names of the President and Secretary and members of the Board of Health in your township and the name of the health officer and furnish him with a copy of the rules and regulations under which this Board operates.

"I am notifying you and all other authorities in Wyoming Valley that the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations must be put into effect in all of the municipalities. Your attention is specifically called to the conditions now existing in and about the Wyoming Valley. Contagious and infectious diseases are prevalent and public health is imperiled. Until within a few days in some municipalities the authorities were utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such a Board. In some instances these Boards of Health were inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties, or both.

"It is imperative that in each of the municipalities and townships in the Valley immediate steps shall be taken to stamp out these infections and contagious diseases and to prevent their recurrence in epidemic form.

"The crisis is so important that it becomes necessary for the State Department of Health to enjoin upon the local authorities of said municipalities and townships the fulfillment of the laws of the Commonwealth relative to the formation of Boards of Health and the proper execution of the sanitary laws of the State. Unless the authorities of any and every municipality where a Board of Health is not organized or where the sanitary laws are not being executed, proceed immediately to fulfill the laws of the Commonwealth respecting these matters, I shall put the case in the hands of the Attorney General to take legal compulsory measures.

"Dr. C. H. Miner will confer with you and your Board of Health with respect to its organization and the rules, regulations and ordinances under which they operate and you are requested to co-operate to the fullest extent to establish a thoroughly efficient Board operating under proper rules and regulations.

"And finally for your information I wish to state that I have placed in the hands of the Department's attorneys, Messrs. Atherton & Jones, of Wilkes-Barre, the matter of the non-observance by the several boroughs of the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

To the Burgess and town council of Hughestown, Swoyersville, Laflin, Yatesville, Wyoming and West Wyoming, Exeter, West Pittston, Kingston, Fortyfort, Dorranceton, Miners Mills, Parsons, Plains township. Wilkes-Barre township Newport township, Sugar Notch and Warrior Run boroughs, the same communication was addressed by the Commissioner of Health that was sent to the Borough of Taylor. Inspectors were stationed in these places where necessary and a very wholesome cleaning up was effected.

PART VI.

Conclusions.

There were 299 cases of typhoid fever in Wilkes-Barre and the Wyoming Valley, investigated by the State Department of Health as hereinbefore fully described. At the same time there was a typhoid fever epidemic at Nescopeck borough, also in the village of Lime Ridge, Columbia County, and in the village of Byrensville. Each was an independent outbreak supposed to have no connection with the Wyoming Valley epidemic. The latter as shown was not due to the infection of the public water, contrary to the opinion of the people in the valley. Milk was the principal medium of transmission. Secondary infection was also large, flies playing no unimportant part, no doubt, in not a few instances. The Department accomplished its purpose of suppressing the outbreak. All of the conditions were favorable for one of the greatest epidemics ever recorded. It was in the Wyoming Valley that the classic typhoid fever epidemic of Plymouth in 1885 occurred. The citizens remembered that history and were prompt in calling upon the State Commissioner of Health for assistance. Having done this the local officials of all but Wilkes-Barre did little more until compelled by the activities of the State Department of Health to take up field work.

In the following table is given by months the number of cases reported by the local authorities to the statistical bureau of the Department at Harrisburg, for the County of Luzerne and the surrounding counties of Wyoming, Bradford, Lackawanna and Columbia. In Susquehanna County where some of the milk consumed in Wilkes-Barre was produced, there were 15 cases only for the months of June to October inclusive and 32 only for the year.

Typhoid Fever Cases Reported to Harrisburg for the Year 1910. By Months.

Month.	County				
	Luzerne.	Wyoming.	Bradford	Lackawanna.	Columbia.
January,	16	1	4	1	3
February,	1	0	2	6	7
March,	4	2	2	3	4
April,	4	1	3	7	3
May,	9	2	3	6	2
June,	7	0	1	2	2
July,	27	0	2	8	2
August,	129	9	8	35	27
September,	80	3	11	31	27
October,	40	3	5	40	58
November,	23	0	7	17	8
December,	12	2	5	13	4
Total,	352	23	53	169	147

Luzerne County had nearly half of the typhoid for the entire year that occurred in these five counties and it had considerably over one-half of all the cases in the urban districts of the five counties for the year. It had less than one-third of the rural cases as will appear in the following table:

Distribution of Typhoid Fever Cases. For Entire Year 1910.

County	Urban.	Rural.	Total.
Luzerne,	283	69	352
Wyoming,	1	22	23
Bradford,	16	37	53
Lackawanna,	166	3	169
Columbia,	45	102	147
Total,	511	233	741

Considering June to October inclusive as the period of the Wyoming Valley epidemic, it will appear from the statistical statement of the distribution of the urban and rural cases during the epidemic, that Luzerne County had 246 urban cases and of these five months out of 390 cases reported for the 5 counties from the urban districts. Wyoming had no urban cases, Bradford 4 only and Columbia 26; but Wyoming had 15 rural cases, Bradford 23 and Columbia 90, while Luzerne had 37 only, in the country districts. Lackawanna County cases were all urban except 2. While the Wyoming Valley considered itself marked by a visitation of typhoid fever it appears, taking the 5 counties together, that the total number of typhoid fever cases were 7 per cent. only of those occurring in the United States. There were 3,267 cases in Pennsylvania for the months of June to October inclusive in the rural districts of which 167 only were reported from the 5 counties mentioned. There were 4,760 cases in Pennsylvania for the same period in the urban districts of which 390 only were reported from the 5 counties mentioned.

Typhoid fever is not peculiar to any locality except in epidemic form. It is so widely distributed throughout the State that while a local outbreak is vividly impressed upon that community the incident of typhoid generally does not make much of an impression. As previously illustrated, typhoid in epidemic form may be expected to appear at numerous places until the disease shall have been largely stamped out. By the carelessness of one individual, a milk supply or a water supply or a food supply to a large number of people may be infected, through the control of the State Department of Health of water works and sewer systems and the disposal of wastes of the household the circuits of transmission from the city to the country and from the country to the town may be cut and barriers be erected to the transmission of the infection. These preventive measures and others of a public measure must be supplemented by municipal and personal hygienic measures to effectually drive typhoid fever from the State.

Urban Typhoid Cases.

1910.	Counties.						
	Luzerne.	Wyoming.	Bradford.	Lackawanna	Columbia.	Total for five counties.	Total for entire State.
June,	5	0	0	2	1	8	279
July,	24	0	0	7	2	33	569
August,	122	0	0	32	9	166	1,232
September,	64	0	2	30	7	103	1,501
October,	31	0	2	40	7	80	1,179
Total,	246	0	4	114	26	390	4.760

Rural Typhoid Cases.

June,	2	0	1	0	1	4	145
July,	3	0	2	1	0	6	201
August,	7	9	8	0	18	42	654
September,	16	3	9	1	20	49	1,136
October,	9	3	3	0	51	66	1,131
Total,	37	15	23	2	90	167	3,267

Total Typhoid Cases.

1910.	Counties.						
	Luzerne.	Wyoming.	Bradford	Lackawanna.	Columbia.	Total for five counties.	Total for entire State.
June,	7	0	1	2	2	12	424
July,	27	0	2	8	2	38	770
August,	129	9	8	35	27	208	1,886
September,	80	3	11	31	27	152	2,637
October,	40	3	5	40	58	146	2,310
Total,	283	15	27	116	116	557	8,027

Unclean milk such as this report has shown is supplied to Wilkes-Barre is a menace to public health, particularly to infants. Children's diseases, which may be attributed to impure milk as well as to other causes, are enteritis, diarrhea, cholera infantum, convulsions and entero-colitis. The city clerk prepared a statement for the Department of reported cases of these diseases in the city for the last two years and up to September 17th, 1910, from which the following table was prepared. The cases were of infants under two years of age.

Infant Diseases Reported at Wilkes-Barre. Cases all Under Two Years of Age.

	Cases by Months.												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Year 1908.													
Enteritis,	0	0	0	0	1	0	2	3	1	3	0	0	10
Diarrhea,	0	0	1	0	0	0	0	1	1	0	0	0	3
Cholera-Infantum,	1	0	0	0	0	1	20	14	5	1	2	0	44
Convulsions,	1	4	4	5	7	1	6	1	1	3	1	2	36
Entero-Colitis,	1	0	1	0	0	0	5	5	3	4	1	0	20
Year 1909.													
Enteritis,	0	0	0	0	1	2	2	2	0	1	1	0	11
Diarrhea,	1	0	0	0	0	0	0	0	1	0	0	0	2
Cholera-Infantum,	1	0	0	1	1	5	12	14	3	5	1	0	43
Convulsions,	1	0	5	3	2	1	3	0	1	2	2	3	23
Entro-Colitis,	0	2	0	0	0	0	1	3	0	0	0	0	6
Year 1910 up to September 17th.													
Enteritis,	0	0	0	1	0	2	5	3	0	----	----	----	11
Diarrhea,	0	0	0	0	0	2	4	1	1	----	----	----	8
Cholera-Infantum,	1	0	0	0	0	9	26	10	3	----	----	----	49
Convulsions,	3	6	7	1	0	0	2	5	0	----	----	----	24
Entro-Colitis,	1	0	0	0	0	1	6	2	0	----	----	----	10

28. TYPHOID FEVER AT NESCOPECK.

On August 19th, the Commissioner of Health instructed the Chief Engineer who was then temporarily stationed at Wilkes-Barre, combating a typhoid fever outbreak in Wyoming Valley, to go to Nescopeck and report the true condition of affairs with respect to typhoid in that borough and Berwick. A visit was paid the same day to the borough and it was ascertained that there were eleven cases of typhoid and seven suspects there, and but two only in Berwick, both towns receiving the water supply but not the same milk supply.

The Board of Health was notified to placard the typhoid fever cases, to distribute circulars, see that the instructions with respect to the care of typhoid fever cases were executed, notify the public to boil the water and the milk and to report promptly the names of physicians who failed to record in their offices all cases of fever attended by them.

On August 20th, assistant engineers Irwin, and Shaughnessy and Officer Zeigler were sent from Wilkes-Barre to carry on the investigation. County Medical Inspector, Dr. Charles H. Miner, came to Nescopeck on August 20th and made an investigation regarding the typhoid fever, since there was a dispute among the physicians as to whether the cases were typhoid or not. Dr. Miner also investigated the fact as to whether suspicious sickness on some of the farms back in the country, at which milk was produced that was subsequently sold in Nescopeck, were typhoid fever cases or not.

On August 22nd, the local authorities being slow to move to do anything, the Chief Engineer, by instructions from the Commissioner of Health, together with Dr. Miner and other officers of the Department mentioned, held a conference with the members of the local Board of Health. The State Department of Health's typhoid fever circular was read, commented upon, the necessity for full compliance with these instructions was emphasized, and the Board was told courteously but firmly that if the town officers further neglected for 24 hours to act, the Commissioner of Health would take the reins of government into his own hands on behalf of the Commonwealth. This course produced the results.

There had not been from the first any malicious intent to violate the law or neglect the performance of duty; it was simply plain inability through lack of knowledge and experience.

Mr. Irwin was absent from August 23rd to September 3rd, during which time Officer Ziegler performed all of the field work for the Department under the direct instructions of the Chief Engineer, from Wilkes-Barre. Subsequently Mr. Irwin returned to Nescopeck and supervised the installation of a sterilizing plant at Berwick, besides concluding the operations in connection with the typhoid outbreak. The following is a full report of these operations:

On September 5th, the Commissioner of Health sent the following communication to the authorities in Nescopeck relative to organization and work which should be done by the local Board of Health:

"To the Burgess and Town Council,
"Thos. H. Smith, Burgess,
"Nescopeck, Pa.

"Gentlemen:—

"It becomes my duty to notify you that the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary precautions must be put into effect in all of the municipalities throughout the Wyoming Valley, or I shall put the case in the hands of the Attorney General to take legal compulsory measures. In some municipalities in the Valley, the authorities have been utterly indifferent to the obligations imposed upon them by law in respect to the appointment of a Board of Health and the providing therefor of ample appropriations to sustain the work of such a Board. In some instances until recently, Boards of Health have been inactive either through lack of funds to conduct the work or through failure to appreciate their responsibility and what may be the result of their indifference to their duties or both. This is an auspicious time when infections and contagious diseases are prevalent and public health is imperiled, to take the necessary steps to establish thoroughly efficient Board of Health organization. You are requested to send to Dr. Charles H. Miner, of Wilkes-Barre, County Medical Inspector for Luzerne County, copies of the rules and regulations and ordinances of your local Board of Health. If these should be improved or extended, Dr. Miner will so inform you and he will advise further with you respecting organization and the work which should be done by your Board of Health.

"For your general information, I wish to state that I have placed in the hands of the Department's attorneys, Messrs. Atherton & Jones, of Wilkes-Barre, the matter of non-observance by several boroughs of the laws of the Commonwealth relative to the appointment of a Board of Health and the enforcement of sanitary regulations. Up to this time it would appear that no litigation will be necessary as there are earnest and active measures being taken by the authorities to atone for their inactivity.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

General Conditions.

Berwick borough, population 5300, is an industrial community supported by one great concern, the American Car and Foundry Company. It lies on a comparatively level plateau, 60 feet higher than the Susquehanna River and on the north bank thereof. The municipal area is about one square mile. It is in the extreme eastern part of the County of Columbia, and is bounded on the west by the borough of West Berwick, population 5500, and on the north and east by Briar Creek Township, where there is a settlement called North Berwick, containing 1000 people or more.

The borough of Nescopeck is located in Luzerne County on the southern side of the Susquehanna River opposite Berwick. The two towns are connected by a highway bridge. The municipal area of Nescopeck is flat and extends along the bank of the Susquehanna River about one mile and back therefrom a half mile. The soil is of a light sandy nature. The buildings are mostly frame dwellings located on good sized house lots. The streets are unpaved and unlighted. Sidewalks of wood and concrete construction pass in front of a majority of the dwellings. The settlement is essentially a residential one of about 1600 people. The men are employed mostly at the American Car and Foundry Company works or by the Pennsylvania Railroad Company.

Typhoid Fever Records.

The Bureau of Vital Statistics of the Department of Health gives the following typhoid fever report during the years 1906 to 1910 inclusive, for the boroughs of Nescopeck and West Berwick:

Nescopeck.

	1906.	1907.	1908.	1909.	1910.
January,	--------	--------	0	1	0
February,	--------	--------	3	1	0
March,	--------	0	0	0	0
April,	--------	0	0	0	0
May,	--------	0	0	0	0
June,	--------	0	0	0	0
July,	--------	0	0	0	0
August,	1	0	1	0	23
September,	--------	0	0	0	3
October,	--------	0	0	0	0
November,	--------	1	0	0	0
December,	5	0	0	0	0
Total,	6	1	4	2	26

Berwick.

	1906.	1907.	1908.	1909.	1910.
January,	0	7	0	0	3
February,	0	0	1	6	4
March,	0	0	1	0	0
April,	0	33	0	1	0
May,	0	0	0	3	1
June,	0	0	0	0	0
July,	0	0	0	1	0
August,	1	0	0	2	6
September,	0	17	0	1	3
October,	4	11	2	0	1
November,	1	1	2	0	1
December,	14	5	0	0	1
Total,	20	74	6	14	20

West Berwick.

	1906.	1907.	1908.	1909.	1910.
January,	--------	--------	0	0	0
February,	3	--------	0	2	1
March,	1	0	4	3	2
April,	--------	0	0	1	0
May,	--------	0	0	2	0
June,	--------	0	0	0	1
July,	2	0	0	0	0
August,	2	1	0	0	0
September,	1	0	1	0	0
October,	--------	0	3	1	0
November,	4	0	0	0	1
December,	4	3	0	0	1
Total,	17	4	8	9	6

During the year 1907, Berwick had a high typhoid fever rate, 37 cases being reported during the month of April and 34 cases reported from September to December inclusive. During that year there was no corresponding increase in the borough of Berwick and West Berwick. Of the 20 cases reported from Berwick in 1910, three were brought from Nescopeck to the Berwick Hospital and should be charged to the borough of Nescopeck. Thus we have but 17 cases of typhoid fever in Berwick. Seven of the 17 cases occurred during the months of January and February and but 9 during August and September when 26 cases were reported from Nescopeck.

Of the 26 cases reported from Nescopeck it was found by examination of the records that two were duplicates, the case of Mrs. John Hays and Fannie Hays, also the case of Mrs. Frances Harter and Mrs. Wilson Horts, thus we have but 24 cases reported from Nescopeck. Twenty-one of these 24 occurred in August, the other three in September.

In the following table are given the actual number of cases of typhoid fever that occurred in Nescopeck during the year 1910. All of them were carefully investigated by the Department.

Cases of Typhoid Fever Canvassed by State Department of Health in Nescopeck, 1910.

Number.	Name.	Date of onset.	Total by months.
1	Mrs. Cora Raup,	July 30	
2	Rev. J. P. German,	Aug. 1	
3	Mary Hogan,	Aug. 1	
4	Franklin Horn,	Aug. 1	
5	Josephine Horn,	Aug. 1	
6	Mrs. John Hays,	Aug. 1	
7	Mrs. Frances Harter,	Aug. 3	
8	Creola Harter,	Aug. 3	
9	Walter Myers,	Aug. 4	
10	Roy Schlotman,	Aug. 6	
11	Elmer Gilbert,	Aug. 6	
12	Geo. T. Splain,	Aug. 10	
13	W. T. Smith,	Aug. 11	Jan. 0
14	Alfred Vanding,	Aug. 11	
15	Mrs. Ida Boyd,	Aug. 11	Feb. 0
16	Mercy A. Schechterly,	Aug. 13	
17	Henry Meise,	Aug. 13	Mar. 0
18	H. R. Ludwig,	Aug. 13	
19	Truman McNeal,	Aug 14	Apr. 1
20	J. A. Boyd,	Aug 15	
21	Mrs. J. J. Myers,	Aug 16	May 0
22	Winifred Myers,	Aug. 16	

Cases of Typhoid Fever Canvassed by State Department of Health in Nescopeck, 1910.—Continued.

Number.	Name.	Date of onset	Total by months
23	Ross Shelp,	Aug. 17	June 0
24	Dale Andres,	Aug. 19	
25	Wm. Roup,	Aug. 21	July 1
26	Mildred Boyd,	Aug. 23	
27	Nina Ray Saunders,	Aug. 24	Aug. 29
28	Mrs. Joseph McElroth,	Aug. 26	
29	Ray Sholes,	May 1	Sept 3
30	Edwin L. Stout,	Aug. 27	
31	Freda Theil,	Sept. 1	Oct. 0
32	Jennie Weiss,	Aug. 24	
33	Wm. Noss,	Sept. 21	Nov. 0
34	Viola Gilbert,	Sept. 21	Dec. 0
	31		34

Notes of explanation are necessary with respect to some of these cases in order to show that they should properly be charged to Nescopeck, although the records of the cases do not appear in the record of the local Boards of Health and were not reported to the Harrisburg office.

The case dated May 1st, was that of Ray Sholes, of Second street. Mr. Sholes was feeling sick about May 1st. The doctor's first visit was May 2nd. He was taken to the Berwick Hospital May 28th and stayed there until July 2nd. Before taken sick he was employed by the American Car and Foundry Company in Berwick. After returning from the hospital on July 2nd, he was not permanently employed throughout the summer. Dr. R. E. Warntz was attending physician and said he could not say positively that Mr. Sholes was afflicted with typhoid fever. The case was not reported to the local board of Health or the State Department of Health; the house was not placarded nor were any disinfectants used while the patient was being cared for at home. It was alleged that Mr. Sholes tended the soda water fountain at the Gould Drug Store on July 4th. This was denied by both he and Mr. Gould. It was also claimed that Mr. Sholes assisted J. A. Boyd to deliver ice. This was also denied by both parties. Mr. Sholes claimed that he did not sell papers as was reported about the borough. Neither did he touch a milk bottle during the time of his entire illness. The milk supplied at his home was purchased from Mr. Keck and Mr. Miller, borough milk dealers. Dr. Miner obtained a blood test from Mr. Sholes and pronounced the case typhoid fever.

Rev. J. P. German, 121 E. 13th Street, Allentown, was visiting at the home of Henry Meiss the last week in July and the first five days in August. He began feeling sick on August 1st and returned home soon after and before consulting a physician. While staying at the home of Mr. Meiss he drank well water obtained from the well on the property of W. J. Stayer and used milk served in bottles by H. J. Miller. It is said that Rev. German did not use borough water. However, the public water supply was in the house and was used for domestic purposes. On August 13th, Mr. Henry Meiss became sick with typhoid fever and is said to have used water from the Stayer well and also the public supply. The sample of water obtained from the Stayer well on August 23rd, gave a total count of 960 and 5 B. Coli. This well was cleaned and improved and the results of the second sample taken on September 2nd, gave 280 total count and no B. Coli.

Mary Hogan of Mifflin boarded at the Horn residence, 826 Third Street, Nescopeck. Date of first feeling sick August 1st. She went to Mifflin on August 13th and the following day was taken seriously ill and could not return to Nescopeck. She was attended by Dr. Howard of Mifflin and the physician pronounced her case that of typhoid fever. While at the Horn home she used water for drinking purposes procured from a well on the property of Ira Spoonberger. The case of Miss Hogan was not reported in the Nescopeck cases as a positive diagnosis had not been made until she was at her home in Mifflin.

On August 1st, two of the Horn children were taken sick and the attending physician, Dr. R. E. Warntz, pronounced both typhoid fever. Berwick public water was in the home but it is said this water was not used for drinking purposes but was used for other domestic purposes.

I. Schlochtman of Pottsville, residing at 509 Broad Street, Nescopeck, was sick from August 6th to 22nd. On August 22nd, Dr. R. E. Warntz, the attending physician pronounced it typhoid fever and had Mr. Schlochman removed at once to Pottsville. Mr. Schlochtman was employed by the Pennsylvania Railroad as an engineer running from Wilkes-Barre to Sunbury. He reported that he had used the public water supply while in Berwick and had also drank from the various wells about town and had also used various water supplies while engaged in work on the railroad. This case was not reported to the local Board of Health because the patient was removed to his home in Pottsville as soon as it was known that he was afflicted with typhoid fever.

Mrs. Ida Boyd of 800 Fourth Street was taken sick on August 1st, and she was said to have typhoid fever on August 21st. Dr. R. E. Warntz, attending physician was not sure of his diagnosis and did not diagnose the case as fever until this late date. Dr. Miner obtained a Widal test and reported the case typhoid.

Mrs. J. J. Myers and her daughter, Winfred Myers of Third Street, Nescopeck, were taken ill with typhoid fever on August 16th. They had used well water at their homes and the public water supply. On August 15th, they left Nescopeck for Palmer, W. Va., and were taken sick enroute. These cases were not reported to the local Board of Health.

William Roup of Second Street, Nescopeck, was taken sick on August 21st. Dr. R. E. Warntz was called in August 25th and Mr. Roup was at once removed to the Berwick Hospital. This case was reported from Berwick and does not appear on the Nescopeck records

Miss Nina Raye Saunders, 701 Third Street, Nescopeck, was taken sick on August 24th, the doctor being called on August 27th. The attending physician, Dr. R. E. Warntz, diagnosed this case as typhoid fever and it must have been reported to the local Board of Health as the house was placarded on August 29th. However, this case does not appear upon the report sent by the local Board of Health to the State Department of Health.

Miss Jennie Weiss, living at the home of Joseph Frederick, Fourth Street, Nescopeck, was taken sick on August 24th. Miss Weiss had been employed at Wilkes-Barre until taken ill, and was then brought to the home of her sister at Joseph Frederick's. Dr. P. H. Jamison was in charge of the case and it was said to be typhoid fever. This case was not reported by the local Board of Health although the Frederick home was placarded. It is probable that Dr. Jamison reported this case to the local Board of Health and the local Board failed to report it to the State Department of Health.

There were 24 cases of typhoid fever reported by the local Board of Health to the State Department of Health. The investigation showed that there should be 10 other cases charged to the borough. Three of these cases were those from other places who were visiting or working in Nescopeck. Two were residents of Nescopeck who did not develop the fever until outside the borough. Three were cases which were pronounced typhoid fever by the attending physician and were placarded as such by the local Board of Health but were not reported to the State Department. One case of fever was brought into the borough of Nescopeck from Wilkes-Barre and was not reported to the State Department of Health although placarded by the local Board of Health. The records of the local Board of Health do not show that the case of Mr. Sholes was ever reported as a typhoid fever case. This case was, however, reported by the local Board of Health of Berwick on May 31st, 1910, at the time Mr. Sholes was being treated at the Berwick Hospital.

The following table gives the number of cases according to ages and sex:

Age.	Male.	Female.	Total.
0-4,	0	1	1
5-9,	3	2	5
10-14,	1	1	2
15-19,	1	3	4
20-24,	2	1	3
25-29,	2	3	5
30-34,	2	2	4
35-39,	1	0	1
40-44,	0	2	2
45-49,	3	1	4
50 and over,	3	0	3
	18	16	34

From the foregoing table it will be noticed that 35.3 per cent of the patients were under 20 years of age and 20.5 per cent. were 45 years of age and over. The cases were almost evenly divided among the males and females. Special notice is called to the fact that the cases are almost evenly divided among the different age periods in both sexes.

The occupations of the 34 typhoid fever patients were as follows:

Pupils,	7
American Car & Foundry Co.,	4
Housewives,	6
At home,	4
Children,	3
Penn. Railroad Co.,	3
Various occupations of 1 each,	7

The American Car and Foundry Company works were furnished with untreated river water throughout the summer. The date of onsets of the four patients employed at the car shops are May 1st, August 17th, August 18th and August 27th. From these dates of onset it is apparent that these four employees were not infected at the same time and as many residents of Nescopeck were employed at the car shops it was improbable that any infection from this source could have been the cause of the general outbreak in Nescopeck.

The date of onsets of the three patients employed at the Pennsylvania Railroad were August 4th, 6th and 22nd.

Possible Sources of Infection.

The times of occurrence, the extent and distribution of the cases indicate some general infection of a mild character and but a few days in duration. The following possible sources of infection were considered:

1st. Green vegetables and fruit,
2nd. Ice Cream,
3rd. Flies.
4th. Ice.
5th. Personal contact,
6th. Local sanitary conditions and sewage disposal,
7th. Vended water supply,
8th. Milk supply,
9th. Public water supply,
10th. Individual water supplies.

GREEN VEGETABLES AND FRUIT. Green vegetables were used by almost all of the households in which typhoid occurred. In most cases the vegetables were raised in their own gardens or bought from neighbors having gardens. It does not seem possible that any general infection could have occurred in way. Fruit was obtained from fruit venders about the borough. Twenty said they had bought fruit from fruit stores in Berwick. It is not possible that infected fruit could have been purchased in Berwick without a similar outbreak having occurred in Berwick.

ICE CREAM. Eighteen fever patients had obtained ice cream from ice cream parlors in Nescopeck and Berwick. The majority of the 18 probably obtained the cream in Berwick. Because of the rumor stating that the infection within the borough had been caused by infected ice cream sold from the Gould Drug Store in Nescopeck, each household was questioned especially concerning this point. But one patient said that he had obtained ice cream from the Gould Drug Store. It is apparent then that ice cream obtained in Berwick could not have cause the fever epidemic in Nescopeck without similar results in Berwick. Also it is certain that no infection could have come from the Gould Drug Store since but one patient obtained cream from that source.

FLIES. Flies were prevalent throughout the borough during the time the fever occurred and about three months prior. The sanitary condition of the borough was such that fly infection was possible. In some cases there had been a fever for several weeks where the stools were not disinfected and buried but were emptied into privy vaults and the wash water thrown to the ground.

Mr. Ray Sholes was sick from about May 1st until May 28th when he was taken to the Berwick Hospital. At no time were disinfectants used about the premises. The place was in good sanitary condition, however, and there was little chance for fly infection. No other cases occurred within the household. Mr. Sholes returned to his home from the Berwick Hospital on July 2nd and was unable to work for the remainder of the summer. After he returned no disinfectants were used.

While fly infection was possible it was not probable that the general outbreak was caused by flies, nor were the cases grouped as would be suspected were the infection carried in that manner.

ICE. The ice supply of Nescopeck was obtained from the Boyd Brothers until about August 20th when other ice was brought in from Berwick. The Boyd Brothers harvested ice from Lilly Lake which lake is controlled by the Boyd Brothers. The sanitary conditions about Lilly Lake were investigated by Department officers and found to be excellent. Also samples of the ice and spring and well, used as domestic water supplies were analyzed by the Department. The ice samples were procured with great care. Each sample was composed of composite samples from several cakes of ice. In selecting samples an endeavor was made to obtain streaked cakes or those made by surface drainage freezing upon ice already formed. The results of the samples collected from the lake were as follows:

	Bacteria per c. c.	B. Coli per c. c.
No. 1 Ice,	0	0
No. 2 Ice,	6	0
No. 3 Well, Boyd residence,	8	0
No. 4 Spring near Boyd residence,	6	0

The spring and well water were used by the majority of those camping about the lake. The ice was received at Nescopeck by Mr. J. A. Boyd and delivered about the borough from a wagon. Seventeen of the 32 typhoid fever patients used ice obtained from Boyd Brothers before taking sick. The ice supply of two cases occurring in September is not known.

There were three cases of typhoid fever in the family of J. A. Boyd, Mrs. J. A. Boyd giving the date of the first feeling sick as August 11th, Mr. J. A. Boyd, August 15th and their daughter Mildred, August 23rd. There had been no fever present in the Boyd family prior to August 11th. The general outbreak occurred August 1st. It would be impossible therefore for any infection from the Boyd family to have caused the general outbreak unless fever had developed in the Boyd family at least three or four weeks before the onset of the first case. According to Dr. Warntz, physician in charge, it is probable the cases developed in the usual manner, that is from 10 to 20 days after infection. As soon as typhoid fever was found in the Boyd family, the ice wagons anl all utensils used about the ice were sterilized and removed to a neighboring barn.

Mr. Boyd. no longer delivered ice and the family was in no way connected with the ice supply. The store house from which the ice was delivered was at the Pennsylvania Railroad siding in another part of the borough.

PERSONAL CONTACT. The majority of the fever cases occurred during a period of time too short for the infection to have been distributed from patient to patient. The patients as a whole had not visited any one fever case and but three had visited any other case according to information obtained from the individuals themselves. The cases were distributed about the whole borough and varied in age and occupation in such a manner that no personal contact could be established.

LOCAL SANITARY CONDITIONS AND SEWAGE DISPOSAL. The local sanitary conditions of the borough as a whole were good. The houses were of wood construction of from six to eight rooms each, such as a well paid laboring class inhabit. The houses were usually owned by the occupants. The lots were spacious and well kept. In the back of the lot in the rear of the dwelling was usually located a garden, small chicken house, outside closet, well for domestic water supply and in some cases a barn and pigpen. The liquid waste from the kitchen was usually thrown upon the garden and the suitable garbage fed to the chicken or pigs. The well was usually located near the back door beneath the porch or a few feet away. With a few exceptions the wells were dug 20 to 30 feet in depth, and walled with roughly laid stone; the wall coming a few inches above the ground surface. The top covering was usually made of unmatched boards or plank. The privies were usually 20 to 25 feet further back from the well and of earthern vault construction. They were closed so that the entrance of flies was almost prohibited. In most every case surface drainage facilities were very poor. The lots were nearly flat and the soil of a black loam such as is deposited by the river overflow. Facilities for drainage to the streets were usually absent. Surface water collected on the surface of the ground and disappeared by percolation or evaporation. The cellars were often damp and poorly ventilated but cleanly in general condition.

The borough has no public sewer system. Information from 32 typhoid fever case regarding this point was as follows:

Privies in use,	22
Inside closets to cesspools,	8
Inside closets to sewer,	2
Total,	32

The only property connected to the sewer on which typhoid fever was located was Dr. J. J. Myers' property, where two cases had developed. Information regarding this sewer line was obtained from servants as the family were all in the South. The information obtained was that this sewer line was 6 inches in diameter and was laid in 1905, being a private sewer line with direct connection to the Susuehanna River. There were four other private sewer lines to the Susquehanna River.

A 6 inch line from Susquehanna House was laid in 1899.
A 6 inch line from the property of A. J. Harter laid in 1902.
A 6 inch line from E. H. Roth's property laid in 1907.
A 6 inch company sewer laid in 1910 but had never been placed in use.

The latter sewer was for sanitary and cellar drainage from the properties of Frank Hoffnagle, George Saxon, George Willon, Calvin Hart, Joe Kirkendall, Guy Kirkendall, W. H. Williams, Philip Stucker and a vacant lot of J. J. Myers.

VENDED WATER SUPPLY. The only water supply sold about the borough of Nescopeck and in any case purchased by typhoid fever patients was that obtained from Edward Payne. Mr. Payne secured the water from a spring on his property located about two miles south of the borough. The spring is about 100 feet from his dwelling and at a slightly lower elevation. It is impossible for any surface drainage coming from about the dwelling to enter the spring. The ground immediately surrounding the spring was originally of a swampy nature and was filled in with stone and earth. Three sides of the spring were enclosed with a cement wall extending about three feet below the surrounding ground surface, and about 2 1-2 feet above the ground surface. Upon the side walls rest a cement arch covering. The front of the spring was enclosed from about 3 feet below the surface of the ground outside to about

4 inches above the surface. A 2 inch galvanized iron pipe carries water from the spring to a point about 12 feet below. The bottles and jugs in which water was conveyed to the borough were filled at the outlet of the 2 inch pipe. On August 22, 1910, a sample of water collected from the spring showed a count of 16 total bacteria and 6 B. Coli. Mr. Payne was advised of the results of the bacteriological examination and ordered to discontinue the sale of spring water until the colon bacillus were removed. On September 7th a second sample was obtained and the results showed 44 total bacteria and 2 B. Coli. After the taking of the second sample the spring was improved by thoroughly cleaning and lining it and by removing the stone and soil that had been placed in the swamp above the spring and filling in the ground above the spring with yellow clay. The clay was tamped about the spring and throughout the portion of the ground above that had been of a swampy nature. Enough clay was used in making the fill to bring the surface of the ground above the spring higher than the surrounding ground so that the surface drainage should be carried away from the spring. Also the front of the spring was closed, so that water could be secured only from the pipe leading from the spring. A third sample was obtained on October 23rd. The result showed 26 total bacteria and no B. Coli. After the results of this sample were received and the spring again inspected, Mr. Payne was allowed to continue the sale of the spring water. This spring water could have had little if any influence upon the typhoid fever outbreak as in no case had the patients used the spring water prior to the development of typhoid fever. The water had been bought by a few of the patients after they were taken sick.

MILK SUPPLY. The general features of the outbreak were not those usual to an outbreak caused by milk borne infection. There were no disproportionately large number of cases among the children, and there was but one instance where two or more cases developed about the same time in the same household. But seven of the thirty-four cases were under 10 years of age and but two under five years of age. The milk supply of Nescopeck was obtained almost wholly from J. Hiram Miller, N. J. Keck, E. A. Brown and cows owned by individuals about the borough. The milk supply of the 32 typhoid fever patients were as follows:

Miller only,	22
Keck only,	1
Miller and Keck,	6
Miller and Mrs. Berth,	1
Mrs. Sinley,	1
Own supply,	1
Total,	32

Of the 32 cases we find that 22 obtained the whole of their milk supply from the Miller dairy and 7 partly from the Miller dairy; thus 29 used milk from the Miller dairy wagon during 30 days prior to their illness. There is little probability that any other milk supply other than the Miller supply could have been the cause of the outbreak.

Mr. J. H. Miller procured 60 quarts of his milk from his own dairy; 25 quarts from J. G. Swank and 20 quarts from C. E. Mowery. All of these milk producers lived on farms in the same community about three miles from the borough. All of these dairies were small and conducted according to the custom prevalent among such farmers. The barns were used for all the stock on the farm and but little attention was given to lighting, ventilating, cleaning the cows or caring for the milk as is done on modern dairy farms.

Mr. N. J. Keck lived on a small farm northeast of Nescopeck. He produced no milk on his farm but bought from Thos. Arter about 40 quarts daily. This amount was distributed about the borough to 32 regular customers and others from bottles or cans. The water supply used for washing the milk utensils was analyzed as well as the well water at the Arter farm. The results are as follows:

Date of collection.		Bacteria per c. c.	B. Coli per c. c.
Aug 22, 1910	Thos. Arter dug well,	76	3
Aug. 22, 1910,	Thos. Arter dug well,	1,500	0
Jan. 23, 1911,	Thos. Arter dug well,	250	0
Jan. 23, 1911	Thos. Arter spring,	36	0
Aug. 22. 1910,	Nathan Keck dug well,	12	1
Oct. 23, 1910	Nathan Keck dug well,	280	0

After the results of the first samples from the Arter and Keck wells were received the owners were informed and the wells were cleaned and improved. After the results of the second samples taken from the Arter well were received the well was again improved and protected from all surface drainage, by grading the ground surrounding it and covering it by water tight covering. Keck supplied but on typhoid fever case with all the milk used and supplied six other cases with a part supply. Mr. Miller furnished a part. There had been no typhoid fever on the Keck property.

Mr. E. A. Brown living on a farm southeast of Nescopeck produced 35 quarts of milk daily on his farm and bought 20 quarts from Bastram Mensinger and 20 quarts from B. C. Longberger. This 75 quarts were sold in both Nescopeck and New Berwick, the greater part being disposed of in Berwick. Mr. Brown used both bottles and cans. He had 18 customers in Nescopeck but no fever patients among his customers. There had been no typhoid fever on the premises for a number of years.

On August 28th, 1910, Mr. Ziegler collected a sample of milk from each of the two wagons delivering milk for Mr. Miller. These samples were procured as the wagons were delivering about the borough. The following results were obtained:

Number.		Total count.	Bacteria per c. c.
34	J. H Miller, wagon No. 1,	16,200,000	135,000
35	J. H Miller, wagon No. 2,	2,700,000	162,000

On September 3rd, the above results were received. At once the local Board of Health was advised not to permit milk from the Miller dairy to enter the borough until all the utensils at the dairy had been sterilized and the dairy as a whole placed in a sanitary condition. Then the dairy was visited to ascertain if possible the cause of the high bacterial content and oversee the sterilization of all dairy utensils. The dairy was reached the evening of September 3rd. Mr. Miller was directed to dispose of any milk on hand and not offer it for sale. The following morning all milk utensils were sterilized by the use of mercuric chloride. The conditions under which milk was procured were then noted.

The farm is located in Mifflin Township, Columbia County, at the foot of the Nescopeck Mountains. The land is rolling and well drained. The buildings are on a gentle sloping plot of ground adjoining the highway and sloping from the barn toward the house. A bank barn which is used for all farm stock is located about 200 feet from the house. The well is about midway between the house and the barn. On the ground floor of the barn was located the horse stable, cow stable, feeding boxes, and a quantity of hay, sufficient for a day's feeding and the milk aerator. This part of the barn had but few windows and but little light could enter. A door from the outside opens into a court in front of the cow stable and horse stable, and a door opens to the outside from both the cow stable and the horse stable. From this court in front of the cow stable and horse stable all parts of the lower part of the barn could be reached. On entering the court from the outside a stable for 11 cows was directly in front; to the right stables for three horses. Both the hores and the cow stables were open into the court from the top of the mangers to the ceiling being a distance of about four feet. Feed boxes were located in front of both these stables. To the left was a stairway leading to the upper floor and at the base of the stairway a pile of hay for the day's feeding. Immediately to the left was a milk cooler.

The cow stable has a flat earthen floor without gutters and poorly drained. The floor above was open so that chaff and dirt could fall into the stable. About half of the cows were admitted at a time. This necessitated the stopping of milking and the driving out and bringing in of the cows. This process created much dust and caused the milkers to touch the cows and dirty their hands before finishing milking. The barnyard was filthy, the manure being 6 to 12 inches deep, and very wet because of recent rains. The cows were confined in this yard and became very filthy. When milking, the cows udders were dusted with a dry cloth and with the milkers' hands. Thus during the process of milking much dirt entered the milk pails. The pails were large and open topped giving access to much dirt coming from the cows' udders or the floor above the stable. The milkers did not wash their hands before milking or after handling the cows. Dry hay was fed to the horses during the milking process and also while the milk was passing the cooler.

The cooler was a conical shaped sheet tin vessel filled with cold water and the milk allowed to run in a thin film over the outer surface. This exposed the milk to the dust about the barn, also the cooler leaked about the side allowing the water from the inside to reach the milk as it aerated. The amount of leakage was small but for cooling purposes the water was obtained from the cistern at the barn and this water was highly colored and stale. While the milking was being done, the horse stable was cleaned and the horses groomed. This filled the whole lower part of the barn with dust and a strong odor of ammonia.

On the morning of September 4th, all the cows and pails were sterilized with mercuric chloride tablets. The cows' udders were washed and the use of a damp cloth before milking was installed. The cow-yard was covered with straw and proposed to be cleaned. The cooler was removed to the milk house located above and near the barn and the proper way of handling milk was discussed. Spring water was brought in barrels from a spring nearby, as the well was not in use having been discontinued due to the results of an analysis made by the Department which gave the following results:

	Total count.	B. Coli per c. c.
August 22, 1910,	18,000	1,500
January 23, 1911,	1,800	0
January 23, 1911,	1,500	12

When the results of the first sample were received the well was closed and was not used again during the year. A second sample could not be obtained until the early part of the year 1911, because the well became dry about three weeks after the first sample was collected.

During the month of September many improvements were made on the Miller dairy regarding the handling of milk and the sanitary conditions of the barn. Two more samples of milk were obtained and these showed the effect of improved methods of caring for the milk. The results were as follows:

	Total count.	B. Coli per c. c.
Sept. 8, J. H. Miller, wagon No. 1,	33,000	15,100
Sept. 16, J. H. Miller, wagon No. 1,	3,400	1,800

The Miller dairy farm was visited by County Medical Inspector Miner. No fever cases were found there nor was there typhoid fever among any of those supplying milk to Mr. Miller.

Mr. Miller furnished milk to one typhoid fever patient before the general outbreak. Mr. Ray Sholes obtained milk from Mr. Miller before going to the hospital in Berwick on May 28th. Mr. Sholes returned to Nescopeck July 2nd, and had not fully recovered. He was again furnished with milk from Mr. Miler after July 2nd. The milk was usually obtained in bottles from the Miller dairy wagon. It is hardly probable that an infected bottle taken from the Sholes property could have caused the general infection through the milk supply. The fact that Mr. Miller had served on his route 29 out of the 32 typhoid fever patients may be explained by the fact that Mr. Miller had two wagons and delivered about twice the amount of milk delivered by any other. Mr. Miller had on his route about 150 customers. Had any can of milk become infected at any time by infection received from the Sholes property more than 29 of the 150 customers would be expected to develop typhoid fever and also the fever would be of a severer type producing many cases in some households and especially among children. It is possible, however, that only a part of the milk supply delivered on some day became infected and this may have been the direct cause of the majority of the fever cases if not all of them.

PUBLIC WATER SUPPLY. The public water supply of Nescopeck is obtained from the Nescopeck Water Supply Company who obtain their water from the Berwick Water Company. The Berwick Water Company supplies water to Nescopeck, Berwick, West Berwick, Briar Creek Township, Columbia County, and Salem Township, Luzerne County.

The water main supplying Nescopeck comes from the Berwick distributing system in such a manner that it would be impossible for a different water to enter Nescopeck then enters Berwick. The Berwick supply is obtained from two small streams called Glen Run and Varner Run and the Susquehanna River. The Glen Run and Varner Runs water sheds are daily patrolled by an officer of the water company. Also the water sheds were thoroughly inspected by Mr. Zeigler during the Nescopeck fever outbreak. No pollutions were found on the watershed and all were in excellent condition when inspected by Mr. Zeigler. The water company has improved the watershed since it was last inspected by the Department. The sanitary improvements are as follows:

Date.	Improvement.	Owner.	Tenant.	Watershed.
1907	Cesspool,	Jackson and Crispen,	O. Wolfinger,	Glen Run
1907	Concrete wall,	Jackson and Crispen,	O. Wolfinger,	Glen Run
1907	Cesspool,	Henry Hiney,	Henry Hiney,	Glen Run
1907	Privy vault,	Harriet Beck,	Harriet Beck,	Glen Run
1907	Privy vault,	Theodore Cope,	Theodore Cope,	Glen Run
[illegible]	Privy vault,	J. S. Keck,	J. S. Keck,	Glen Run
[illegible]	Privy vault,	Theodore Pattock,	Henry Pollock,	Glen Run
[illegible]	Dry closet,	Jas. Varner,	Jas. Varner,	Glen Run

The water company has purchased what is known as the Varner property, which was located on the head waters of the Varner Run. This property contained three small houses which were inhabited by three different Varner families and as it was impossible to make improvements which would protect the stream the properties were purchased by the water company and placed in a sanitary condition and are not inhabited. This removed the worst properties on the water shed.

On February 11th, 1908, application was made to build an additional impounding dam on Glen Run in order to increase the storage capacity in order to.obviate the use of Susquehanna River water during dry periods. A permit was given by the Commissioner of Health for the work and the dam was completed and put in use in 1909. In the spring of 1910, the impounding dams including the new one were overflowing and conditions during the summer were normal. However, the supply again failed and Susquehanna River water was turned on on September 21st, 1910.

The American Car and Foundry Company which is the largest industrial consumer obtained raw river water from the Berwick Water Company during the entire summer This industrial supply was furnished by a separate system and had no connection with the town's domestic supply except by way of one valve. This valve was closed and sealed by the water company. On September 21st, at 2.30 p. m., the valve admitting raw water into the supply furnished the city was opened in the presence of Mr. Zeigler and Mr. Zeigler observed that the valve had been sealed, and the seal not broken until the valve was opened at that time. When the river water was turned on, the chloride of lime apparatus was put in operation and the water continually dosed with .058 grains of lime per gallon. The lime was obtained in 300 pounds metalllic drums and probably contained from 35 to 37 per cent. available chlorine. Special precautions were taken in treating the water because of the large amount of typhoid fever cases on the water shed farther up the river.

On September 19th and 20th, the Berwick Water Company had notices of the use of the river water distributed to their water consumers. Also the local board of health notified all keepers of soda water fountains and hotels concerning the predicted use of the river water. Chlorinated lime was constantly added while the river water was used for the borough supply.

In the American Car and Foundry Company's shops signs were posted in many conspicuous places warning the employes not to use the river water for domestic purposes, also numerous taps were conveniently located so that the men may procure the mountain water supply for drinking purposes. Notices at these points called the attention of the employes to the places where drinking water could be procured. It is said that often these warning signs are unheeded and the workmen procured river water for drinking purposes. While many residents in Nescopeck were employed in the car shops it cannot be said that the river water used at the shops could have been the direct cause of the outbreak in Nescopeck. But four of the 32 cases had been employed in the car shops.

Samples of Public Supplies.

The results of the analyses of samples of public water supplies collected before and after the water was treated with chloride of lime is shown in the following table:

Results of Analyses of Public Water Samples.

Source.	Date of collection.	Total bacteria per c. c.	B. Coli per c. c.	Remarks.
	1910			
W. S. Schechterly tap.	Aug. 22	3	0	Not treated
Spring at pump station,	Sept. 6	180	4	Not treated.
Spring at pump station,	Sept. 20	81	0	Not treated.
Tap on pump,	Sept. 20	1	0	Not treated.
Tap Hotel Morton,	Sept. 20	2	0	Treated.
Tap Susquehanna Hotel,	Sept. 21	6	0	Treated.
Tap Hotel Morton,	Sept. 21	4	0	Treated.
Spring at pump station,	Sept. 21	12	0	Not treated.
Spring at pump station,	Sept. 21	60	0	Not treated.
Tap on pump,	Sept. 21	4	0	Treated.
Tap Dickson Building,	Sept. 21	2	0	Treated.
Spring at pump station,	Oct. 3	3,600	0	Not treated
Tap on pump,	Oct. 3	840	0	Treated.
Tap Cor. 6th and Chestnut,	Oct. 3	1,000	0	Not treated.
Tap Dickson Building,	Oct. 3	15,000	0	Not treated.
Tap Cor. Pine and 7th,	Oct. 3	3,000	2	Not treated.
Tap Cor. Oak and Front,	Oct. 3	8	0	Not treated.
Tap Cor. Second and Pine,	Oct. 10	300	0	Not treated.
Spring at pump station,	Oct. 10	200	0	Not treated.
Tap Cor. 6th and Pine,	Oct. 10	100	1	Treated.
Tap Cor. 2nd and Mulberry,	Oct. 10	600	0	Treated.
Tap Cor. 15th and Market,	Oct. 10	80	0	Treated.
Tap Cor. 2nd and 5th,	Oct. 11	10	0	Treated.
Tap Cor. Euclid and ——,	Nov. 26	280	0	Treated.
Tap Cor. 7th and Pine,	Nov. 26	80	0	Treated
Tap Cor. Market and Front,	Nov. 26	8	0	Treated.
Tap Cor. Mulberry and Front,	Nov. 26	4	0	Treated.

It will be noted from the results that the chlorinated lime process reduced the number of total bacteria in the raw water. The results of the samples collected from the tap on the pump at the pumping station during the time when the water was being treated showed a very low total count of bacteria and at no time was B. Coli present. Two samples collected from taps about the distributing system show the presence of B. Coli. The presence of these B. Coli in the treated water may be due to the fact that the treating process had been in operation but a short time and the sediment in the distributing system had not been completely flushed out.

INDIVIDUAL WATER SUPPLIES. Bacteriological samples were collected from all individual water supplies within the borough of Nescopeck suspected of having caused typhoid fever or having any connection in any way with the typhoid fever outbreak, also samples were collected from the water supplies of those furnishing milk to the borough and from the water supply from those from whom the milk dealers at any time purchased milk.

When the results of any samples showed the presence of B. Coli, the occupants of the premises on which the water supply was located were urged to clean the well or spring and disinfect it if possible by the use of lime and improve it if possible so that it would be impossible for surface drainage to enter. After improvements were made a second sample was obtained and if the results of the second sample were free from B. Coli, the supply was considered safe and again put in use but if the results showed the presence of B. Coli, the supply was again improved if the occupant of the premises was willing and a third sample was collected. When a third sample showed the presence of B. Coli after all possible improvements had been made the supply was condemned and the users of the supply were advised to no longer consider the supply as safe for domestic consumption. When the occupants or owner of the premises on which the supply was located that showed the presence of B. Coli would make no improvements or in any way obey the orders of the Department officers or of the local Board of Health, those in the immediate neighborhood were notified concerning the condition of the water supply and warned not to use the supply for domestic purposes.

The following table gives the names of the owner on which the individual water supply was located, the source of supply, dates when the various collections were made, results of the analyses and the action taken by the occupant when the supplies showed the presence of colon bacilli.

Results of Anaylses of Individual Water Sample.

Name.	Source.	Collection.	Bacteria per c. c.	B. Coli per c. c.	Notes.
James Karchner.	Dug well	Aug. 22	60	1	Party moved away.
R. E. Parker,	Dug well	Aug. 22	4	0	Not resampled.
J. W. Swank,	Spring,	Aug. 22	140	20	Spring cleaned disinfected and graded.
J. G. Swank,	Spring,	Sept. 7	300	0	
C. E. Mowry,	Dug well	Aug. 22	330	30	
C. E. Mowry,	Dug well	Sept. 7	180	20	Well cleaned and disinfected.
C. E. Mowry,	Dug well	Oct. 23	90	0	
J. C. Mensinger,	Dug well	Aug. 22	24	0	
Ed. Payne,	Spring,	Aug. 22	110	6	
Ed. Payne,	Spring,	Sept. 7	44	2	Spring cleaned and protected.
Ed. Payne,	Spring,	Oct. 23	26	0	
J Hirman Miller,	Dug well	Aug. 22	18,000	1,500	Well went dry soon after first sample when water appeared in winter last samples taken and well closed.
J. Hirman Miller,	Dug well	Jan. 23	1,800	0	
J. Hirman Miller,	Dug well	Jan. 23	1,500	12	
Gabriel Lutz,	Spring,	Aug. 22	42	0	
Philip Miller,	Dug well	Aug. 22	126	4	Well cleaned and protected.
Philip Miller,	Dug well	Oct. 23	210	0	
Philip Miller,	Spring,	Aug. 22	100	0	
Thomas Arter,	Dug well	Aug. 22	76	3	Well cleaned and protected.
Thomas Arter,	Dug well	Oct. 23	1,500	8	
Thomas Arter,	Dug well	Jan. 23	250	0	
Thomas Arter,	Spring,	Jan. 23	36	0	
Nathan Keck,	Dug well	Aug. 22	12	1	Well cleaned and protected.

Name.	Source.	Collection.	Bacteria per c. c.	B. Coli per c. c.	Notes.
Nathan Keck,	Dug well	Oct. 23	280	0	
W. L. Smith,	Dug well	Aug. 22	8	0	
C. Floyd Seeley,	Spring,	Aug. 22	3	0	
Alfred Vandling,	Dug well	Aug. 22	0	0	
Francis Harter,	Dug well	Aug. 22	2	0	
B. F. Birth,	Dug well	Aug. 22	1	0	
William McNeal,	Dug well	Aug. 22	16	0	
William Gilbert,	Dug well	Aug. 22	40	0	
H. L. Hetlar,	Dug well	Aug. 22	170	0	
Public School,	Dug well	Aug. 22	8	0	
J. F. Myers,	Dug well	Aug. 22	10	0	
Ray Sholes,	Dug well	Aug. 22	110	0	
J. A. Boyd,	Dug well	Aug. 22	40	0	
Samuel Y. Smith,	Dug well	Aug. 22	12	0	
George Sprain,	Dug well	Aug. 22	40	1	Instructed to improve but refused.
John Hays,	Dug well	Aug. 22	126	0	
Harry Brochyers,	Dug well	Aug. 22	720	0	
Bruce Stout,	Dug well	Aug. 23	12	0	
George Hebart,	Dug well	Aug. 23	8	0	
J. Richard,	Dug well	Aug. 23	6	0	
Arthur Warantz,	Dug well	Aug. 23	20	0	
John Shaffer,	Dug well	Aug.-23	150	4	Condemned and closed after second sampling.
John Shaffer,	Dug well	Sept. 8	180	16	
Alvin Warantz,	Dug well	Aug. 23	120	5	Instructed to improve but refused.
James Large,	Dug well	Aug. 23	50	0	
George Harris,	Dug well	Aug. 23	18	0	
J. P. Young,	Dug well	Aug. 23	8	0	
G. F. Blittenblinder,	Dug well	Aug. 23	20	3	
G. F. Blittenblinder,	Dug well	Sept. 8	2,700	20	Condemned but not closed
John Myers,	Dug well	Aug. 23	24	0	
Wm. Roaf,	Dug well	Aug. 23	12	0	
W. H. Stayer,	Dug well	Aug. 23	960	5	
W. H. Stayer,	Dug well	Sept. 7	280	0	Cleaned and improved.
W. L. Croll,	Dug well	Aug. 23	0	0	
Lloyd Sheif,	Dug well	Aug. 23	1	0	
C. R. Woodin,	Spring,	Aug. 27	24	0	
A. A. Brifogle,	Dug well	Aug. 23	6	0	
John Yorks,	Spring,	Aug. 27	210	0	
Berwick Store Co.,	Drilled well.	Aug. 27	19	0	
Chas. Pollock,	Spring,	Sept. 16	84	8	Spring cleaned and graded.
Chas. Pollock,	Spring,	Oct. 27	13,000	0	
John Timbrell,	Spring,	Sept. 16	80	1	Notified of result but no action taken.
H. C. Stout,	Dug well	Sept 16	44	6	
Dr Warntz,	Dug well	Sept. 7	1,500	285	

Local Board of Health.

The local board of health was almost inactive. Little was done other than reporting communicable diseases to the State Department of Health and placarding houses containing contagious diseases. Even this duty was not wholly performed as not all the typhoid fever cases were reported to the State Department of Health when the premises containing these cases were placarded by the local Board of Health.

Mr. Ray H. Sholes resigned as local Health Officer and Mr. Warren Pifer was appointed. Mr. Pifer made a house to house inspection of the borough under orders of the local Board of Health. This inspection was to determine whether the yards, privies, cellars and drainage facilities of the properties were in a sanitary condition. This work was not completed when the Department officers left the borough.

Local Board of Health.

The local board of health was almost inactive. Little was done other than reporting communicable disease to the State Department of Health and placarding houses containing contagious diseases. Even this duty was not wholly performed as not all the typhoid fever cases were reported to the State Department of Health when the premises containing these cases were placarded by the local Board of Health.

Mr. Ray H. Sholes resigned as local Health Officer and Mr. Warren Pifer was appointed. Mr. Pifer made a house to house inspection of the borough under orders of the local Board of Health. This inspection was to determine whether the yards, privies, cellars and drainage facilities of the properties were in a sanitary condition. This work was not completed when the Department officers left the borough.

Conclusions.

After a study of the information received from the typhoid fever patients or those of the household and after considering the local conditions, it is concluded that the following possible sources of infection had little if any influence upon the outbreak: Green vegetables and fruit; ice cream; ice; vended water supply; individual water supplies and personal contact.

From the local sanitary condition and the disposal of sewage as was previously described, infection of flies was possible and it is very probable that this source of infection had much to do with extending the period during which the fever was prevalent in the borough.

It is possible that the Miller milk supply could have had considerable to do with the spread of typhoid fever within the borough. All of the fever patients having their dates of onset prior to August 14th, obtained their milk supply from the Miller dairy. The other two cases that did not receive their milk supply from the Miller diary had their dates of onset August 24th and September 1st, respectively. It is possible then that the sudden outbreak within the borough could have been due to an infection distributed through the Miller milk. The infection causing the cases having onsets on August 14th, August 24th and September 1st, could have been due to secondary infection. Had the whole of the Miller milk supply been infected any one day more cases would be expected than developed. Had only a part of the milk supply been infected, it is difficult to understand why the cases were distributed about the borough and did in no way conform to the route usually taken by the Miller dairy wagons in distributing the milk. The ages of the fever patients were not such as would be expected had the infection come wholly from the milk. While it is not known that there were any means whereby the milk supply could have become infected either at the Miller dairy or at the dairies of those furnishing them with milk, it is known that milk was delivered to and bottles were received from typhoid fever premises before the general outbreak. Eighteen of the 29 fever patients who were furnished with milk from the Miller dairy obtained the milk almost always in bottles. These customers were considered "bottle customers" as the milk was usually left in bottles unless otherwise designated by the householders. The other 11 fever cases who received Miller milk obtained the milk in vessels furnished by the householder and taken to the wagon. It was customary, however, for these customers to often obtain the milk in bottles as well as buckets. This was done when an extra amount of milk was secured as it was easier to keep cool in bottles or when the usual milk container was not at hand when the dairy wagon came. This variation of the use of bottles and the number of bottles required each day makes it probable that empty bottles taken from typhoid fever residences were refilled and delivered elsewhere. No exact statement could be obtained. As soon as Departmental officers arrived in the borough special instructions were given concerning the delivering of milk in bottles and thereafter no milk was left at places placarded with typhoid fever signs.

It is not probable that the public water supply could have had anything to do with the fever outbreak or similar outbreaks would have occurred in Berwick and West Berwick.

29. TYPHOID FEVER IN TEXAS TOWNSHIP, WAYNE COUNTY.

About the middle of August, Dr. H. B. Ely, of Honesdale borough, County Medical Inspector for Wayne County, acquainted the Commissioner of Health that an outbreak of typhoid fever in a suburb of Honesdale, located on the opposite bank of the Lackawaxen River in Texas Township where reside about 500 people had occurred To all practical purposes it is a part of Honesdale. At that time the Chief Engineer with a large field force, was at Wilkes-Barre in an adjoining county, Luzerne, working to suppress an incipient outbreak of typhoid fever in the Wyoming Valley. The Commissioner of Health instructed Dr. Ely to get in telephone communication with the Chief Engineer. On August 22nd Assistant Engineers Irwin and Shaughnessy were detailed from the Wilkes-Barre force to go to Honesdale and take up the work in Texas Township of investigating the typhoid fever. Twenty-four cases of the disease were discovered in the said district of the township known as River Street settlement. The spread of the infection was attributed to flies and pollution of well waters, particularly the former. Unsanitary conditions abounded, which were corrected. The following is a report of the Department's operations:

General Conditions.

Honesdale borough, the county seat of Wayne County, is situated in the valley at the junction of Lackawaxen and Dyberry Creeks. The population in 1910 was 2,945. The borough is surrounded on all sides by mountainous country reaching at many places an elevation of 1,400 to 1,500 feet.

The borough is located in about the center of Texas Township. The boundary line falls within the built-up section so that in the township there is a population about equal to that of Honesdale itself. One of the built-up sections of Texas township is almost directly east of Honesdale on the opposite side of Lackawaxen River below its junction with Dyberry Creek and on the opposite side of Dyberry Creek above the junction. In this part of the township called River Street District, a road called River Street parallels the stream for a distance of about one mile and extends into the township. Two bridges connect this street with Honesdale, one being at the southern extremity of the borough and the other at the center. At River Street the ground surface rises at approximately a 50 per cent. grade until it reaches an elevation of about 125 feet. Upon this exceedingly steep hillside are two streets paralleling River Street a part of the way. These streets are called Cottage Street and Cliff Street, the highest one being Cliff Street. With but a few exceptions all dwellings on River Street, Cottage and Cliff Streets are on the east or up-hill side. In many of the dwellings the second floor front opens on the ground surface in the rear. The majority of the dwellings are poorly constructed frame dwellings, some being little more than shacks inhabited by one to three families. Strictly speaking, this is the poor district of Honesdale. The men, boys and girls are mostly employed in the various nearby factories. Many of the women do washing for Honesdale families and some work by the day in the borough.

Public Water System of Honesdale.

In the early part of the nineteenth century three natural bodies of water, located about five miles above Honesdale, on the eastern slopes of the West Branch watershed and known as Glass Factory Ponds Number One, Two and Three, were appropriated and used by glass manufactories whose mills were located near Honesdale as a source of water supply. On April eleventh, eighteen hundred and sixty-three, under Act of Assembly, the Honesdale Water Company was granted a charter. This company at once gained control of the three ponds and proceeded to furnish water to Honesdale and Texas township. About a mile and a half southeast of Honesdale, on the watershed of the west branch, is a natural body of water known as Cadjaw Pond. During the life of the Delaware and Hudson Canal Company, this pond was owned and used as a canal feeder. When the canal was abandoned, it involved the disuse of the pond.

On June twentieth, nineteen hundred and two, the Consumers Water Company of Honesdale was incorporated. This company obtained Cadjaw Pond of the Delaware and Hudson Company, subject to the condition that the said Consumers Water Company furnish certain Delaware and Hudson Company water tanks used for railroad purposes with water as long as the said water company used the pond as a supply. When the Consumers Water Company entered Honesdale borough to install its system of pipes, the Honesdale Water Company obtained an injunction but before the case was tried in a Court of Equity the Honesdale Company sold its rights and property to the Consumers Water Company, and the latter was incorporated as the Honesdale Consolidated Water Company. This concern is the only corporation supplying water in Honesdale and vicinity at the present time. Many of the citizens own stock.

The three Glass Factory Ponds lie close together. They are fed by springs. Number Three is the northerly one. Its outlet is into the West Branch. This pond is connected with Number Two which is a mile or more south by a syphon line, so that the discharge of Number Three may be carried into Number Two at any time. Pond Number Two flows directly into Pond No. One. The water from the latter is taken out through a twelve inch cast-iron pipe of short length and emptied into an open water course which has a length of about two miles to an inlet reservoir which is formed by a stone and earth embankment about twenty feet high built across the run and provided with a waste way.

From this intake reservoir an eight inch cast-iron pipe conveys the water to a pair of small distributing reservoirs in the built-up district of the town.

The three ponds are located on the mountain tops, are surrounded by unoccupied wooded land, the water is clear and the source appears to be ideal. The total area of the three bodies of water is about one hundred and thirty acres. They are of about a uniform size. The available draft is said to be about seven feet on all three.

There is a run which flows into the intake reservoir which drains a valley about two miles long above the point where the water from Pond Number One enters the stream and in the upper valley of this run there are several farm buildings on this watershed. A cheese factory in the district formerly was drained to the water course, but a cesspool is now provided on the property. Below the junction of the lake water and the stream there are several farm houses, but these are in a sanitary condition and several thousand feet from the stream except in one place where two farm houses are on a steep incline and distant from the stream two hundred feet only. These two places have been looked after by the water company. It is said that closet vaults are being built by the company for these places. Entering a part of the reservoir is a small run having its source about one mile distant. Along this course are three farms and buildings. One is unoccupied, and the other two are in close contact with the stream. The water is polluted by pigpens. The privies are located so close to the run as to be a menace, although they were in a fair condition at the time of the Department's inspection.

Cadjaw Pond is supplied by springs. It has a small watershed. There is one dwelling on the area. The area of the lake is eighty acres. Twelve feet of water is available according to reports and if this be true its storage capacity is equal to that of the three ponds.

The water of Cadjaw Pond is not clear and bright in comparison with the other sources. The bottom of the pond is mud. The flow is small and the water becomes objectionable every summer, due to a growth of algae and similar vegetable forms.

The Complaints Against the Public Water.

In July of 1908 complaints by the public of Honesdale that the water supply was polluted and causing general contamination, were made to the State Department of Health and the Commissioner of Health was requested to order an investigation to be made of the sewerage and water supply systems of Honesdale.

The cause of the public complaint about the water from the popular standpoint was a disagreeable taste and odor. No outbreak of the waterborne disease was manifest. The water was examined microscopically for the presence of certain algae known to possess the power to cause a bade taste and odor in the water. Such growths were absent in the water of the three ponds, but a luxuriant growth was found in the inlet reservoir. It was of the filamous type which does not cause trouble during the period of its growth, but it does cause trouble in the fall of the year during decay. So this organism did not produce the cause of the complaint.

In Cadjaw Pond water and in the Honesdale tap water where a mixture of the water from the three ponds and from the Cadjaw Ponds occurs, algae of the troublesome kind were found These vegetables emit oils which are very disagreeable to the senses. Probably they caused the trouble complained of. These algae appear in small numbers in the tap water at the time of the examination but they were found in large numbers in Cadjaw Pond.

It was reported by the water company that the Carjaw Pond source was used as a general supply but twice and that each time for about one-half hour only. One of these times occurred immediately before the complaint about the quality of the water. However, the valve on the supply pipe from Cadjaw Pond is slightly open to maintain constant but small stream through the pipe to the town and thus the algae could have found its way into the distributing system of the borough at any time.

The Decrees of the Commissioners of Health.

On March 12th, 1909, the Commissioner of Health issued the following decree to the water company:

"Among other remedies two suggest themselves as worthy of mention. First, the treatment of the Cadjaw Pond water with a chemical solution to kill the algae; and, second, the abandonment of the Cadjaw Pond supply altogether.

"With respect to the first proposition, it may be said that the pond was originally not much more than a swamp and even now, after it has been artifically improved by the construction of a dam to increase the storage, there remains a large percentage of shallow flowage and around the edges there is much swampy ground and low bush growth with a soil cover of muck and mud, all of which are favorable in the extreme to the deterioration of the quality of the water of the pond. The cost of a germicide treatment would be considerable. Of course, this treatment would have to be for all of the water in the pond and not for that part of it drawn off into the public system.

"With respect to the second proposition it should be understood that Cadjaw Pond is elevated above Honesdale sufficiently to give a pressure of one hundred and fifty pounds, the pipe line has a reducer attached which is opened only in case of fires.

"The water company is required to furnish adequate pressure for fire purposes. The two distributing reservoirs in the town on the Glass Factory Ponds supply line are of so low an elevation that they give out forty-five to fifty pounds pressure in the lower parts of the borough. In some of the higher parts of the town the house tops are nearly on a level with the reservoirs. Thus there is no adequate pressure from the Glass Factory Ponds line as now arranged. Consequently if the Cadjaw Pond supply was cut off the borough fire service would be rendered inadequate unless a plan were put in force to increase the pressure in some other way.

"The Glass Factory Ponds are naturally elevated far above the level of the Cadjaw Pond but all of this height and more is sacrificed. The intake reservoir from which the head is secured to force the water into the crib distributing reservoirs of the town is at a much lower level than that of Cadjaw Pond. There is no reason, except that principally of expense, and even expense would not be prohibitive, why a new intake dam and reservoir should not be built on the run higher up the valley but below the Glass Factory Ponds, and built at a sufficient elevation to give all the pressure requisite in the borough. The twin distributing reservoirs should be abandoned and a new and larger reservoir be located higher up the same hillside. The pipe line connecting the new inlet reservoir to the new distributing reservoir should be at least twelve inches in diameter.

"Relative to the capacity of the Glass Factory Ponds and the run, it may be noted that the available storage of the ponds is equivalent to two hundred and twenty-five million gallons. The flow of the run is in excess of this. The water company supplies in all six hundred families. The greater part of the daily consumption of water is by the factories and mills. There are forty-nine such consumers including ten cut glass factories, fourteen water motors at small factories, one brewery and seven bottling works and three slaughter houses. These places are all large consumers. The amount of water used daily is not controlled, there being no meters installed by the water company, all of which facts show that in spite of extravagant use of water the Glass Factory Ponds and the run have been able to meet the demands.

"It has been determined that the interest of the public health will be subserved thereby, and a request is hereby and herein made to the water company to give the entire subject of making changes and improvements to its waterworks system and improvement of its source of supply a careful and early consideration and to submit the conclusions and any plans it may have devised to the State Department of Health for approval."

Honesdale Borough Typhoid Fever Record.

Since the River Street District of Texas township is so closely related by distance, occupation and public water supply to Honesdale borough the typhoid fever record of both will be considered.

The typhoid fever record of Honesdale borough according to the Bureau of Vital Statistics of the Department of Health is as follows:

Honesdale Borough Typhoid Fever Record.

	1905	1906	1907	1908	1909	1910
January,		------	1	0	0	0
February,	0	0	0	0	0	0
March,		0	0	0	0	0
April,		------	0	0	0	0
May,		0	0	0	0	0
June,		------	0	0	0	0
July,		0	------	0	0	0
August,		------	0	1	0	2
September,		------	0	1	1	1
October,		1	0	1	0	1
November,	0	0	------	0	0	0
December,	0	1	0	0	0	0
Total,	0	2	1	3	1	4

From this report it is apparent that Honesdale borough has been exceedingly free from typhoid fever and this is believed to be true. The two cases of August, 1910, are those of Josephine and Elizabeth Everling Both of these cases are from Cottage Street, Texas township. The case of Josephine Everling was reported from Texas township as well as from Honesdale borough.

The case reported for September, 1910, is that of George Taeubner, of Honesdale, the nightwatchman employed at Rickerts livery. Mr. Taeubner had been about the country in various places during the thirty days prior to date of onset and it is impossible to give any cause of infection. The sanitary conditions of his dwelling place were excellent.

The case reported for October was that of Charles Weaver, a hotel keeper of Honesdale. No cause of infection could be found.

There were then, as shown above, but two cases of typhoid fever for 1910 within the borough of Honesdale having a population of 2,945.

Typhoid Fever Record for Texas Township.

The record of the Bureau of Vital Statistics of the State Department of Health shows that during 1910 there were 24 cases of typhoid fever in Texas Township. While making an investigation concerning the cause of typhoid fever in the River Street District of Texas Township census cards were filled out for all cases found. Twenty-four typhoid fever cases were recorded on the census cards in the usual way. Upon comparing the names of the cases obtained in this manner with the names upon the records of the Bureau of Vital Statistics it was found that the Bureau of Vital Statistics record had but two names that were not secured during the investigation. One case was not located in this part of Texas Township and had no relation to the typhoid fever being investigated. This was the case of Elizabeth McLavish, 9 years of age, and having date of onset September 3rd. The other case not secured during the investigation was that of Alice Van Stunberg, 10 years of age, date of onset December 27th. This case occurred in the same household as the case of Michael Van Stunberg, 12 years of age, having date of onset October 10th. This may have been a secondary case.

The two cases obtained during the investigation that are not recorded in the Bureau of Vital Statistics are those of Clarence Rogers and Elizabeth Everling. The case of Clarence Rogers having date of onset July 15th was followed by three other cases in the same household having dates of onset July 18th, 28th and August 20th. The case of Elizabeth Everling having date of onset August 2nd was followed by one other case in the same household on August 8th. It was understood at the time of the investigation that the physicians attending these two cases would report then to the Department.

In the following table is given the dates of onset of typhoid fever cases occurring in 1909 and 1910 in Texas Township that were canvassed by Mr. Irwin in 1910:

Texas Township Fever Cases for 1909 and 1910. Canvassed by State Department of Health.

Month.	Number of cases.	
	1909	1910
January,	0	0
February,	0	0
March,	0	0
April,	0	0
May,	0	0
June,	0	0
July,	1	3
August,	1	12
September,	5	3
October,	0	6
November,	0	0
December,	0	0
Total,	7	24

All but one of these cases was in the River Street District. This occurred in October, 1910, in a distant part of the township.

It will be noted in the foregoing table that typhoid fever in this district begins in July and extends late into the fall. The greater part of the fever occurs in dwellings located on River Street. Two of the River Street dwellings had typhoid fever in them in 1909 and also in 1910. In the Cunningham home on River Street in 1909 and in the same house in 1910 occurred the case of Mrs. McArdle. In the Roberts house on River Street, there were two cases in 1909 and two cases in 1910. Furthermore, in another part of the house occupied by the Roberts family occurred the case of John Ashby and in a small house in the rear a few feet distant occurred the case of Mrs. Anna Landis in 1909.

From the location of the cases and the dates of their onset it would appear that both in 1909 and 1910 typhoid fever had started in one household and then spread to adjacent households both up and down the river.

In the following table is shown the sex and age of the 7 cases of 1909 and the 24 cases of 1910 concerning which census cards were obtained:

Age.	1909.		1910.	
	Male.	Female.	Male.	Female.
0- 4,				
5- 9,				2
10-14,	2	3	2	3
15-19,			1	4
20-24,			2	2
25-29,	1			4
30-34,				
35-39,				2
40-44,				
45-49,		1		
50-over.			1	1
	3	4	6	18

THE PUBLIC AND PRIVATE WATER SUPPLIES. In the following table is given the water supply for the 24 cases investigated in the year 1910:

Water Supply for the 24 Cases in 1910.

Public water supply only,	9
Well or spring water only,	1
Public supply and Shaffer well,	2
Various supplies,	2
Kelsch well,	1
Miller well,	1
Smith well,	1
Palmer well,	1
Dodd well,	2
VanStunberg well,	1
Manaton Spring,	2
Dudley well,	1

In the above table it is shown that 23 of the 24 cases used the public water supply. However, only 9 of the cases used the public water supply without other supplies. Wells and spring are common through this part of the township and many of these local supplies were in use by the fever patients as well as the public water. The public water supply is that obtained from Honesdale Consolidated Water Company which furnishes the whole of the public water supply in the borough of Honesdale and also other parts of Texas township. The supply is healthful although improvements should be made to render it more palatable and free from taste and odors due to algage growths in certain parts.

An inspection was made of all occupied estates on the stream entering the intake dam from which the water coming from the three glass factory ponds is obtained and also inspections were made of occupied estates on the watershed of the three glass factory ponds and Cadjaw Pond. Few pollutions were found and those that were found were not of a serious nature. Abatement notices were served but in a few instances an abatement was not obtained before the end of the year.

The freedom of the borough of Honesdale from any water borne disease is sufficient proof that the public water supply had no part in the cause of typhoid fever in Texas township.

Bacteriological samples were collected from the public water supply and from a number of wells and springs in use within the infected district. In the following table is shown the name of the sample collected and the name of the collector the results received from the Laboratory. In three instances B. Coli were shown in the tap water obtained from the public water supply. This is no more than could be expected since the surface stream entering the intake dam is bordered for several miles by pasture lands. It will also be noticed that in four instances local supplies showed the presence of B. Coli. The owners of these supplies were requested to make improvements as is the custom but no improvements were made and the supplies were placarded and no further samples collected.

Public and Individual Water Samples.

Date of collection.	Collector.	Name of Sample.	Total bacteria.	B. Coli.
1910.				
Aug. 11,	Dr. F. P. Griffin,	Tap, Rogers, River St.,	28000	8
Aug. 11,	Dr. F. P. Griffin,	Well, Rogers, River St.,	9000	0
Aug. 25,	R. E. Irwin,	Tap, Rogers, River St.,	1800	0
Aug. 25,	R. E. Irwin,	Well, Rogers, River St.,	2400	0
Aug. 25,	R. E. Irwin,	Well, Shaffer,	2700	6
Aug. 25,	R. E. Irwin,	Well, Smith,	600	0
Aug. 25,	M. E. Shaughnessy,	Well, Peter Everling,	3240	5
Aug. 25,	M. E. Shaughnessy,	Tap, Eddingers,	670	0
Aug. 25,	M. E. Shaughnessy,	Well, Chas. Schinger,	3600	5
Aug. 25,	M. E. Shaughnessy,	Tap, John Bangor,	230	0
Aug. 25,	M. E. Shaughnessy,	Tap, Hall Brothers,	420	0
Aug. 25,	M. E. Shaughnessy,	Tap, D. & H. Station	1320	2
Aug. 29,	R. E. Irwin,	Cemetery Spring,	1920	6
Aug. 29,	R. E. Irwin,	Well, Wm. Kelseh,	36	3
Aug. 29,	R. E. Irwin,	Outlet, reservoir No. 1,	14	0
Aug. 29,	R. E. Irwin,	Cadjaw Pond reservoir,	4	0
Aug. 29,	R. E. Irwin,	Intake reservoir,	34	2

THE MILK SUPPLY.—The milk supply for the 24 typhoid fever cases for 1910 was from various sources. Every milk dealer peddling milk about this part of Texas township also delivered milk in Honesdale. All but three of the 24 fever cases obtained milk from these public milk dealers and in no way could these dealers be suspected of attributing to the cause of typhoid fever in this district.

NUISANCES ABATED.—As previously stated, in the River Street District of Texas township those infected with typhoid fever were among the less resourceful class. Sanitary inspections were made on all properties along River Street immediately opposite Honesdale and along Cottage and Cliff streets. There were a total of 93 families. In some instances two or three famiies living in a single house. The sanitary conditions throughout were exceedingly bad and especially so along River Street immediately below Cottage Street. There were no public sewers in this district and but a few private sewers. The private sewers empty directly into Lackawanna river below water level. For the majority of the houses along River Street privies were located on the river bank. These were not walled up and were in exceedingly unsanitary condition being open to flies and created local nuisances. Aong this street twenty written notices were served and in each case this notice was primarily for the removal, cleaning or walling up of privies. One verbal notice was served on the secretary of Texas township school. This school house is located in the built-up section. Action was taken by the secretary before a written notice was served. The following table gives the name and address of the owners of the prop- on which notices were served; number of families living on the properties, character of the pollution and the result of re-inspection:

Name and Address.	No. of Families.	Pollution.	Re-inspection Result.
Eno Highhouse, 303 River St.,	2	Privy, K. W & W. W.,	Privy cleaned and limed.
Mrs. Nathan Jacobs, 310 River St.,	2	Privy,	Privy cleaned and limed.
George Wofram, 359 River St.,	1	Privy,	Privy cleaned and limed.
Fred Walters, 348 River St.,	1	Privy,	Closet and bath installed.
Annie Wonnocott, 359 River St.,	2	Privy,	Cleaned and limed.
Albert Bryant, River St.,	3	Privy,	Privy cleaned and limed.
Mrs. Elizabeth Miller, River St.,	2	Privy, K. W. & W. W.,	Cleaned and box installed.
Eugene Miller, 381 River St.,	1	Privy,	Removed.
John L. Shaffer, 383 River St.,	1	Privy,	Boarded up but not satisfactory.
Michael Kromes, 419 River St.,	1	Privy,	Cleaned.
Mrs. Effie Sherman, 423 River St.,	1	Privy,	Cleaned, limed, and walled.
Mrs. L. C. Cook, 441 River St.,	2	Privy,	Cleaned and limed.
Mrs. C. W. Smith, 448 River St.,	2	Privy,	Cleaned and limed.
Albert Bryant, 461 River St.,	2	Privy,	Cleaned and limed.
Frank P. Kimble and Geo. Seaman,	2	Privy, K. W. & W. W.,	Cleaned and limed.
Julius Keltz, River St.,	1	Privy, K. W. & W. W.,	Privy cleaned.
Mrs. Annis McCain,	1	Privy,	Privy cleaned.
Dan Peil, River St.,	1	Privy,	Privy cleaned.
Mrs. Elizabeth Bussa,	1	Privy,	Cleaned, limed and walled.
Richard Penwarden, River St.,	2	Privy,	Cleaned, but still open on river bank.
Twenty notices,	30		
Texas Twp. school house,	1	Privy, verbal notice,	Cleaned.

Note—K. W. & W. W. (Kitchen waste and wash water).

In the hillside above River street and in the township immediately adjoining this built up section five written notices and one verbal notice were served. In the following table is shown the number and address of the owners of the property, the number of families located on the property, character of the pollution and the results from re-inspection:

Name and Address.	No. of Families.	Pollution.	Re-inspection Result.
John Decker,	1	Night soil and dead animals.	Animals burned and night soil ploughed under.
Mrs. Patrick Herbert,	1	Privy, K. W. & W. W.,	Privy cleaned and limed.
Abraham Decker,	1	Night soil,	Ploughed under.
Christopher Hook,	1	Urinal, K. W. & W. W.,	Urinal removed.
H. B. Holbert,	1	Barnyard pigpen K. W. & W. W.	Barnyard cleaned. Pigpen removed.
Mrs. Anna Everling (verbal),	1	Privy,	
	6		

Discussion.

The hillside in the River street district being exceedingly steep and composed of loose shale rock, is not a suitable place for the location of privies. This district should be sewered and property owners seem anxious that this sewer should be built. Under present conditions the sewer, either public or private, will be a great improvement in the local sanitary conditions and would only slightly increase the pollution of the river. Because of this condition no notices were served upon those properties having individual sewers discharging into the creek. With the removal and the improvement of the privies located on the bank of the stream the source of typhoid fever has been removed, as it is believed typhoid fever in this district was almost wholy caused by fly borne infection. The typhoid record for the coming year will indicate to a great extent whether or not the cause has been eliminated.

The borough of Honesdale has no public sewer system. However, the borough is fairly well sewered. The sewers being laid by individuals and by numerous companies formed by property owners along the streets. Those properties located close to either of the streams usually have a sewer for each property. Those properties located further away are usually connected to a sewer owned and promoted by a company composed of a few of the original promoters. Some of these company sewers have one hundred or more properties connected. In this way some of the streets have as high as five sewers passing through a great part of their length and entering the creek. The sewers are laid at different grades and are various sizes. As the borough increases in size the problem is becoming serious and unsanitary conditions are being created. It is high time the borough should have a modern sewerage system built in conformity to a plan of sewage disposal. The borough could easily finance such a proposition. With the installation of a public sewer system which would undoubtedly lead to a point further down stream there would then be a way whereby sewers located on River, Cottage and Cliff streets in Texas township could be connected with the borough system. Until this is done it would be a hardship to compel the township to install sewers. While making the investigation as much information as possible was obtained regarding the location and size of private and local company sewers located in Honesdale borough and the location and the size of these sewers were plotted upon a borough map now on file in the Department.

With the improved sanitary conditions in the typhoid afflicted district of Texas township, it is believed that another year will show a marked decrease in the number of cases. There is no reason why this district should not be as healthful as Honesdale itself. However, satisfactory sanitary conditions will be next to impossible to maintain, at least until sewers are built. The citizens of Honesdale borough should take an active interest in the matter. Many of the properties in the River street district are owned by residents of Honesdale. The township authorities should see that the proper sanitary conditions are maintained, more especially since these owners are well able to provide said properties with modern sanitary facilities.

30. TYPHOID AT THE PENNSYLVANIA INDUSTRIAL REFORMATORY AT HUNTINGDON, PA.

About the first of September, 1910, a telephone communication was received from the Superintendent of the Pennsylvania Industrial Reformatory at Huntingdon, asking that the State Department of Health examine the water works system of the institution and trace the cause of the out-break of typhoid fever among the inmates. The investigation by direction of the Commissioner of Health was placed in the hands of the Chief Engineer. Assistant Engineer Howard E. Moses went to Huntingdon on September fourth and conducted the investigation. The following is a report of what was done and the recommendations offered for permanent relief.

General Conditions.

The Pennsylvania Industrial Reformatory, a State Institution, opened for the reception of inmates February 18, 1889, as a place of confinement for male first offenders between the ages of 15 and 25 years of age, is located along the west bank of the Frankstown Branch of the Juniata river, in Smithfield township, Huntingdon County. The Institution lies directly across the river from the borough of Huntingdon and about 1½ miles northwest from the business centre of this town. The grounds extend along the west bank of the Juniata comprising in all about 250 acres. The largest portion of this area is the Institution Farm which is a model of its kind and kept up to a high state of efficiency. This occupies an island in the river opposite the administration building and a generally rolling plateau, rising from the west bank of the river to the north and west. About 400 feet back from the river bank and approximately 30 feet higher than the ordinary stage of the stream is located a walled enclosure 10 acres in extent, inside of which are located the wards, administration and industrial buildings. Directly outside of the wall and connected thereto and flanking either side of the main entrance are two buildings used as dwellings by the Superintendent of the Institution and his assistant.

A mean of access to Huntingdon is provided by a highway bridge across the Juniata about a half mile below the Reformatory. A spur line of the Huntingdon and Broadtop Railroad, used for freight purposes, extends inside the wall. Directly south and adjacent to the Institution lies the small village of Smithfield, a community of possibly 400 inhabitants, in which reside many of the officers of the Institution.

The brick wall surrounding the Institution buildings is 30 feet high and encloses an area about 675 feet square. This enclosure is almost entirely occupied by the various buildings of the Institution which almost without exception are of brick or stone construction. The main entrance leads directly into the administration building, placed just inside the wall on the river side of the Institution. This is octagonal in shape, three stories high, the lower floor comprising the officers' assembly room, the second floor, the business offices of the Institution, and the third floor, the large assembly hall used for chapel and entertainment purposes. Radiating from the administration building are the four cell houses and a main corridor which leads back from the front of the Institution to the industrial buildings located in the rear of the enclosure. Flanking either side of this corridor and near the rear end of it are the inmates' and officers' dining room, kitchen, drill room, bath houses and laundry.

The cell houses are designated by the letters A, B, C and D, each letter indicating a specific grade in the life of the inmates. The cell houses are each 60 feet wide and from 250 to 300 feet long. Directly through the centre of each house extends a double row of iron cells, four tiers high. Fire proof construction is used throughout these buildings. Each cell is provided with an iron bed, a wash bowl with running water attached and a hopper of the flush type variety. Absolute cleanliness of the cell he occupies is demanded of each inmate, the floors of the cell houses are of masonry construction and kept scrupulously clean.

At the extreme end of the corridor and on opposite sides thereof are the laundry and kitchen. Directly back of the kitchen is located the cold storage house. Along the corridor between the kitchen and the administration build- is placed the inmates' dining room and adjacent to that a smaller building used as a dining room by the officers. Directly across the corridor from the inmates' dining room is the drill room and lying between the drill room and the laundry is the general bath-room.

The above collection of buildings occupies about one-half of the enclosure, the balance being given to the various industrial buildings, comprising two main work shops, machine shop, foundry, boiler house, blacksmith shop, stable, greenhouse and several small buildings used for various purposes. In this portion of the enclosure also is an area used as a drill ground.

The farm buildings of the Institution are located outside the walls about a quarter of a mile northwest. The principal buildings here comprise the dwelling, house and a large barn, a piggery, slaughter house, a small power house and several small buildings including a spring house. Every building is of modern construction and represents modern ideas in high grade farming. Along the western edge of the farm in a wooded tract a fenced area has been set aside and is used as an outside piggery. Part of the farm lies on a river island directly in front of the Institution, this having a length of probably three quarters of a mile and an average width of 1,000 feet. Part of the upper end of this island is occasionally inundated during extreme high water in the river. There is but one building on the island, this being used principally as a store house. About a half mile up the river is the Reformatory quarry. Here at intervals some of the inmates are employed in getting out stone.

Sewer System.

All sewage and roof and storm water within the walled enclosure is conducted by a 36 inch brick sewer to and discharged into the Juniata River, with the exception of sewage from Ward D, which reaches the river through a 12 inch sewer discharing therein at a point 300 feet up stream from the 36 inch sewer outlet. The 12 inch sewer passes immediately south of the pumping station located along the banks of the river, by means of which river water is forced up into the Institution and used for inferior purposes. There are no sanitary sewerage facilities about the Institution other than those of the flush type variety, all of which are connected with the sewer system.

The Legislature of 1909 appropriated a sum of $30,000 to be used by the Reformatory in building an improved sewerage, drainage and sewage disposal works. The money was to be available only on the condition that the plans proposed for the system should be approved by the State Department of Health, and consequently on August 11th, 1909, the Reformatory submitted to said Department for approval a set of plans, which were reviewed and acted upon favorably.

The proposed plan calls for a separate system of drains for roof and storm water and a separate system of sewers for the removal of sewage. The roof and surface water will be discharged directly into the river, while the sanitary sewage is to be intercepted and conveyed to a collecting basin or pump well at the river pump station and from here raised to a sewage disposal works located along the river bank about 1,000 feet up stream from the Reformatory. As soon as this plant is installed, and it will be completed when sufficient money for the construction of the same is forthcoming, all of the sewage will be treated therein and the purified effluent only be discharged into the river. Up to the present time only the collecting basin at the pump house has been completed and an addition to the pump house providing sufficient space for the installation of the force pumps by which the sewage will be lifted to the disposal works.

Water Supply.

Water for use in the Institution and at the farm is obtained from two sources, namely the Juniata river and several springs located in the foot hills of Warriors Ridge about three-quarters of a mile west of the Institution. Water is distributed throughout the buildings through two distinct systems of pipes, one of which is used wholly for the spring water and the other for the river water. There were, however, at the time of the investigation, four places where crossover connections were maintained between the two distributing systems, one underneath the machine shop, a second in the main pipe duct at the end of the bath house and the other two in Ward D. In each case the valves through which connection was made between the two systems were placed horizontally in the pipe line, and in the case of the first two mentioned the valve wheels fastened with padlocks, and in the case of the last two the wheels were removed. It would scarcely be possible for one of these valves to have been opened by any one except an officer of the Institution or by an inmate under his direction.

The system used in supplying river water to the Institution comprises a pump station located along the west bank of the Juniata directly in front of the upper end of the walled enclosure and a pipe distributing system delivering the water at various points throughout the Institution. The pump station is a one story brick building 15 feet by 40 feet in plan, housing a 12 and 18½ by 10¼ by 10 compound, horizontal Worthington duplex pump, with a pumping capacity of about 700 gallons per minute. In addition there is a smaller unit used only in case of emergency. From the pump house two 14 inch cast iron pipes extend out into the river to a point about midway in the channel. The ends of these pipes are screened and through them the water flows by gravity into the pump well 10 feet square placed inside the pump house. The bottom of this well is said to be 6 feet below the bed of the river. Under normal conditions about 10 feet of water stands in the well. The suction pipes from the pumps extend down into the well and a 12 inch force main leads from the pump up to the Institution, passing under the wall at the northeast corner. A branch line from the force main extends outside from down stream in front of the wall and connects with several fire plugs located on the lawn. Another branch line leads to the farm buildings. After passing under the wall the force main extends along the inner side to the power plant, thence through the main pipe duct under the main corridor into the cell houses. A branch from this latter portion of the line leads through the enclosure towards the southern wall and at various intervals along said line branches extend into the works and the various smaller buildings located in the enclosure. This line also connects with fire plugs scattered about in the enclosure.

The pump at the river station operates automatically and during the greater portion of the day is in continuous use. The greatest consumption of water furnished through this pump is probably between the hours of 5 a. m. and 9 p. m. the use of the same during the hours of the night being much less than during the day time.

The collecting reservoir of the domestic water supply system lies in Smithfield township about three-quarters of a mile west of the Reformatory on the southern side of a State highway extending from Huntingdon to McConnellstown, in close proximity to the buildings on the Mason farm. The reservoir is located in the centre of a field about one acre in area, this tract being surrounded by a high picket fence. It is distant from the roadway 120 feet, on an average. The basin is roughly rectangular in shape, divided into approximately equal parts by a wall extending across the reservoir about midway of its length. The compartment nearest the Reformatory is known as Basin No. 1 and the other as Basin No. 2. A waste weir in the dividing wall allows the water to pass from one basin to the other. At the upper end of Basin No. 2 a spillway is provided, through which the overflow water may pass into a drain and thence into a small stream which later on joins the Juniata river. The reservoir has a total length of about 350 feet and a width of 143 feet. The inside walls are sloping, both the walls and floor of the reservoir being lined with masonry which is surfaced with cement in order to secure water tightness. The reservoir has a depth of approximately 4 feet to the crest of the spillway. The waste weir between the two compartments is at a slightly lower elevation.

From each compartment of the reservoir a blow-off pipe extends to the small run and likewise from each basin a valved intake pipe, these, beyond the basin, converging into the main supply pipe which extends from the reservoir to the Institution. At the bottom the dividing wall at each side of the reservoir a pipe has been placed extending through the wall, each pipe being valved. By this means the water can be passed from one basin into the other and by the system of valves on the intake pipes the supply can be drawn from either basin independently, or from both basins at the same time.

The source of supply of water for this reservoir consists of several springs located in the reservoir and the immediate neighborhood. The supply reaching basin No. 2 directly is from a small spring located along side of said basin, which during the recent investigation showed a flow of about 1,200 gallons a day. All other water reaching this basin passes first through Basin No. 1. At the lower end of Basin No. 1 the main supply of water for this system is obtained through several large springs, water from which finds its way into the basin through openings left in the floor of the same. There are two such openings. In addition to these springs, water is piped into Basin No. 1 from two other springs located in the extreme western corner of the reservoir field. The larger of the two is contained in a spring house built in the field directly along the highway. Near at hand is located the other spring, water from which is piped into the pipe leading from the spring-house to Basin No. 1. The spring in the spring-house is by far the larger of the two, and, next to the main spring in the bottom of Basin No. 1, constitutes the chief supply.

All of these sources of supply have been carefully protected; the spring-house door is kept locked, as is also the gate leading into the reservoir enclosure. The spring-house is used by the occupants of the Mason farm as a place in which to store milk. No milk cans, however, are washed in this house. The floor is concreted and thoroughly drained, with a ledge running along the side of the floor nearest the spring in order to prevent any drainage from the floor finding its way therein.

The surplus water from this spring passes out of the spring-house and down through the field to a stone and brick gutter running along the upper side of the reservoir enclosure and is wasted. Both of the other springs in this enclosure have been carefully walled in and are covered with iron doors. This supply of water is not used for drinking purposes by the occupants of the farm house, a well close to the farm house suppying their needs.

Adequate facilities have been provided at the reservoir for surface drainage. A stone and brick gutter extends from the highway along each end of the enclosure uniting below the reservoir on the side opposite the highway into a common drain which empties into a surface stream nearby and at a lower point. All of the road drainage, surface barn-yard drainage and kitchen and laundry wastes from the Mason farm is collected in ditches alongside the highway and diverted around the reservoir through these gutters. The drainage from the surface of the barn-yard reaches the ditch over the top of the ground, no artificial drains being provided. At the farm house into a 12 inch pipe extending above the surface near the pump kitchen and laundry wastes are both emptied, finding their way into the ditch alongside the road through a four inch drain to which the 12 inch pipe connects. It is claimed that when the reesrvoir was built the space between the reservoir and the highway was excavated and filled in with broken stone with blind drains sloping to either end of the field, and over the broken stone a layer of dirt placed so that the ground water is thus carried around the basin. Along the side of the reservoir farthest from the highway the natural surface of the ground slopes rapidly into a gully in the field beyond.

Through the eight inch gravity supply main the water flows from the reservoir into the pump house located in the machine shop, inside the Reformatory enclosure. There is said to be sufficient fall from the reservoir to the Institution to lift this supply of water as high as the second tier of cells in the ward houses, and the water can be delivered directly into the spring water distribution system. However, it ordinarily is raised through an 8 by 12 and 10½ by 10 compound, duplex Worthington pump, with a rated capacity of 800 gallons per minute, placed on the floor of the machine shop, to a pressure reservoir located on the hilltop outside the walled enclosure. The gravity main enters the basement of this building and ends in an iron sand box, with which is connected the suction pipe from the pump. The force main from the pump extends to the pressure reservoir and also connects directly with the distribution system, a valve in each pipe allowing the water to be delivered to the reservoir or directly into the system. When the consumption is heavy and the pump is working, only the surplus water finds its way into the pressure reesrvoir. It is in the basement of this building in the vicinity of the pump suction that the main cross-over valve between the two distribution systems is placed.

The pressure reservoir of the spring water system is of masonry construction, 70 feet in diameter, with a total depth of 10 feet and an effective depth of 8½ feet, having a storage capacity of approximately 250,000 gallons. The wall of the basin is carried above the natural ground level and around the wall is placed a sloping embankment. The whole basin is covered with a conical shaped roof, carried on a brick wall about 8 feet high. The water enters and leaves this reservoir near the bottom through the 8 inch rising main, which in turn serves as a supply basin. The pressure reservoir is located at a sufficiently high elevation to force the water to the highest point of the Institution buildings.

In addition to the supply derived from the reservoir and that taken from the springs, there is a further supply of water at the farm milk-house. A small spring-house is situated about 100 feet from the barn at the edge of the orchard. Water from the spring contained therein is piped to the milk room, which is located adjacent to the barn underneath the inclined roadway leading up to the barn floor, it is here run into concrete troughs and is used in cooling the milk and rinsing the various utensils.

The floor of the spring house is located about one foot below the natural surface of the ground outside the house. The spring is at one corner of the house and the overflow therefrom passes out through a concrete channel several inches below the floor. It has been customary to place in this channel the milk crocks used by the farmer's family. At the time of the Department's inspection the floor of this spring house was not provided with any drain, nor was there any ledge along the edge of the channel to prevent waste water or dirt from the floor getting into the spring. This, however, has been corrected, as will be more fully described further on in the report.

The only other sources of water supply about the Institution are a well located at the store house on the island farm and a small spring near the Institution's quarry, both of which are used occasionally by the inmates when they happen to be working in the vicinity.

In general the spring water is used for all domestic purposes and the river water for all industrial and inferior purposes about the Institution. A detailed statement of the supply of water to each building and the place in the Institution appears in the following table:

Building or Place.	Supply.	Use.	Remarks.
Lawn	River water	Sprinkling, scrubbing and fire.	
Superintendent's residence	Spring water	Domestic.	
Assistant Superintendent's residence	Spring water	Domestic.	
Outside green house	River water	General use	Spring water carried in for drinking purposes.
Farm—			
Dwelling	Spring water	Domestic.	
Stable	River water	Scrubbing	
	Spring water	Stock supply.	
Milk room	Small spring on farm	washing utensils.	
Piggery	River water	Flushing purposes.	
Slaughter house	River water	Flushing purposes.	
	Spring water	Drinking and washing meat.	
Cell Houses—			
Cells	Spring water	Drinking and washing.	
	River water	Flush for hoppers.	
Corridors	River water	Scrubbing.	
Main Office	Spring water	Drinking, washing and lavatory	
Hospital	Spring water	General purposes	
	River water	Bath-room.	
Dining Rooms—			
Officers'	No water tap in this room		
Inmates'	Spring water	Drinking	
Drill room	Spring water	Drinking and flush closets.	
Bath house	River water	Bathing purposes.	
Laundry	Spring water	Washing, etc.	
	River water	Laundry purposes	All river water heated.
Kitchen	Spring water	All purposes.	
Cold storage	Spring water	Cooling tanks.	
	River water	Scrubbing.	
Machine shop	Spring water	Drinking.	
	River water	Industrial uses.	
Power plant	Spring water	Drinking	
	River water,	Industrial uses.	
Boiler house	Spring water	Drinking.	
	River water	Industrial uses.	
Blacksmith shop	Spring water	Drinking.	
	River water	Industrial uses	
Industrial buildings	River water	Industrial uses.	Spring water supply carried into buildings in buckets.
Nos. 1 and 2	Spring water	Drinking.	
Stable	River water	General uses except drinking	Spring water for drinking carried in.
Enclosure yard*	River water	Fire purposes.	
	Spring water	Drinking.	
Watch towers	Spring water	Drinking.	

Note—Prior to the outbreak of typhoid fever in the Institution, that is about the middle of August, river water was used in the kitchen for washing purposes, this supply first passing through steam coils in the boiler house. About the middle of August this supply was disconnected from the kitchen and since then spring water only has been used.

Inmates and Institutional Life.

A brief description of the inmates and the nature of their life in the Institution is necessary to fully understand the conditions met with in the Reformatory. The aim and purpose of the Institution, as set forth in the report of the Board of Managers, is "To prevent young first offenders against the laws of the State from becoming criminals, and to subject them while in custody to such remedial, preventative treatment, training and instruction as may make them honest, reputable citizens, under such a discipline as will secure to each instruction in the rudiments of an English education, and in such manual, handicraft, skilled vocations as may be useful to each of the inmates after his discharge from the Reformatory, whereby he will be able to obtain self-supporting employment, and to be under such control as shall prevent him from committing crime, best secure his self-support, and accomplish his reformation."

Up to the end of the year 1908, 6,528 commitments had been made to the Reformatory. The average population of the Institution has been steadily increasing. From 1897 to 1904, inclusive, the average population during the year was 529. For the next four years it was 735. During August of the current year the average population was about 800, with about 100 officers. The average age of the inmates when received at the Reformatory is about nineteen years and the average maximum term is 5¼ years. All sentences are indeterminate, and, except for certain crimes, an inmate can, upon good behavior, be paroled at the end of from 12 to 13 months. By far the larger number of inmates obtain their release through the parole system.

The greatest effort is made to safeguard the health of the inmates. Each newcomer is at once taken to the barber shop, thence to the bath-room where he takes a shower bath and discards the clothes he wore, which if not in good condition are destroyed. He is then examined by the resident physician, vaccinated and further examined by the Superintendent of Schools with reference to his educational advantages and by the clerk of the Reformatory as to his previous life, and later by the physicial director of the gymnasium, this last examination being repeated every six months or oftener. At the first the newcomer is placed in the second or intermediate grade from which he is promoted or demoted to higher or lower grades according to his conduct. He is assigned to daily systematic exercise in the gymnasium and also to military drill, all of the inmates being obliged to enter into the last two pursuits except the incorrigibles.

The merit system is in vogue in the Institution. There are four grades, each of which has its distinctive uniform and privileges. On reaching the first or highest grade, the inmate is quartered in Ward D and takes his meals in the main dining-room, the inmates of all other grades being served their meals in their cells. The inmates are required to attend school except during the months of July and August and are given instruction in the various trades. All of the boys are obliged to labor during a certain part of the day for the entire week, Sunday excepted. They are employed in the various shops about the place. In this manner the work of the Institution is carried on and the inmates incidentally receive training in the different handicrafts. Some of the boys are sent outside to work around the grounds, generally under the charge of an officer.

Great attention is paid to the physical welfare and health of the inmates. A large percentage of the boys received at the Institution inherit tendencies to poor health, which condition has been aggravated through previous dissipated living. In off setting this the gymnasium plays a large part. Continuous effort is made to maintain cleanliness. Those of the inmates suffering from communicable diseases are placed in separate cells and retained there under treatment until cured. All patients seriously ill are treated in the hospital. For the moral uplifting of the inmates a chaplain is stationed at the Institution and religious services are held on Sunday, and at various times lectures and entertainments are provided. Ordinarily but one inmate is placed in a cell. There are 800 cells in the Institution and owing to the grade system pursued and the increase in population it becomes occasionally necessary to place two inmates in the same cell.

The Institution has a resident physician who constantly looks after the health of the inhabitants. In an Institution of this size more or less thickness is bound to occur. However, great effort is made to maintain sanitary conditions about the place. Out of a total population of 6,528 persons, in almost twenty years, only 65 deaths have occurred.

Previous Occurrence of Typhoid Fever.

Records relative to the existence of typhoid fever in the Institution are available since its opening with the exception of three years. From these records it appears that cases of typhoid fever occurred each year in varying numbers for the entire period, but in no previous year in such numbers as during the summer of 1910. To no definite cause have the cases occurring prior to the current year been ascribed. One hundred and six cases of typhoid fever, with fourteen deaths, have occurred in the Institution from 1889 to 1910 inclusive, with the omission of the three years referred to above. The monthly and yearly occurrence of these cases and deaths is set forth in detail in the folowing table:

Cases of Typhoid Fever at Pennsylvania Industrial Reformatory.

YEAR	January	February	March	April	May	June	July	August	September	October	November	December	Yearly Total	Deaths
1889										1			1	
1890							1	1		1			3	1
1891 no record,							1	1		1			3	1
1892 no record														
1893														
1894		2									9	3	12	1
1895	1	1		1							8		10	1
1896	1		1			1			1	1			6	
1897			2					1		1			5	1
1898						1					2		4	1
1899						1						1	2	
1900			1						1				2	
1901		1			1	1				1			2	1
1902				2			1					1	5	
1903	2	2	1		1		1				1		4	1
1904, no record									1	1	1	1	10	2
1905			1	1										
1906				1			1				1	1	5	1
1907				1			1			1			8	1
1908		1		1		3							1	1
1909					1								6	
1910						1			1				2	
							3	16	6	2			28	2
Total for months	4	7	6	7	8	8	8	18	11	9	22	7	106	14

Recent Outbreak and Corrective Measures.

From the above record it appears that the number of cases occurring during the current year was over double the number occurring in any previous year. The first case of typhoid fever in 1910 was admitted to the Reformatory hospital on June 15th. No further cases occurred until July 25th, at which date the second patient was taken to the hospital, and on July 28th and 29th respectively, one additional case was admitted. The next case was admitted to the hospital on August 14th, beginning with which date the epidemic assumed its greatest proportions, cases occurring as late as October 7th. The height of the epidemic, however, was reached during the latter half of the month of August, 16 cases out of a total of 28 for the year occurring in this time.

The presence of an undue amount of typhoid fever in the Reformatory was called to the attention of the State Health authorities during the first week in August and the County Medical Inspector, Dr. H. C. Frontz, made an inspection at the Reformatory and secured a set of samples of the water supply from various places about the Institution which were later analyzed at the Department Laboratories in Philadelphia. On August 22nd the resident physician, Dr. L. D. Smith, obtained a second set of samples from the water and milk supply of the Institution, which were also analyzed. The results of the latter analyses showed the presence of polluted water. The Institution authorities became alarmed and in the first part of September appealed to the State Department of Health for aid, as a result of which an officer of the Department began an investigation of sanitary conditions at the Reformatory on September 4th, concluding said investigation on September 14th.

At the beginning of the investigation it was ascertained that up to September 4th, 23 cases of typhoid fever had occurred in the Institution, the first on June 15th, the next three on July 25th, 28th and 29th respectively, and the balance from the 14th of August to September 3rd inclusive; all but three of these later cases occurring in the last half of the month of August. Since September 3rd, five additional cases have occurred. In all, two deaths have resulted from these cases, one that of a patient admitted to the hospital on July 28th, and the other in the case of the last patient admitted to the hospital on October 7th.

Certain precautionary measures had been taken by the Reformatory authorities. This included the cleaning of the spring water reservoir at the Mason farm in June and again about August 15th, the serving of boiled water to the inmates in Ward D and to the officers, all of whom take their meals in general dining-rooms. The rest of the inmates, however, who eat in their cells, were not receiving boiled water, but drank the spring water supply coming from the taps in each cell. The connection from the kitchen with the river water distribution system had been broken. This water was formerly used for inferior purposes, including the washing of some of the utensils and particularly the milk cans, in the kitchen. It is claimed, however, that the only river water used first passed through the steam coils in the boiler house and was consequently more or less sterile. There was, however, a possibility of some of this water getting through into the kitchen before it had been rendered sterile, and owing to the well known pollution of the Juniata river at this point, as a matter of precaution, the supply was cut off entirely from the kitchen. The gymnasium clothes worn by the inmates were disinfected, the windows of the hospital were screened, the inmates were carefully warned at the chapel exercises as to the necessity of refraining from drinking river water. and from eating raw vegetables and urged to take particular precautions as regards cleanliness. Warning signs cautioning against the drinking of river water had been placed throughout all the buildings at the river water taps. All of the cases had been removed to the hospital and were under the constant supervision of the resident physician or trusted attendants.

The disposal of the patients' stools was carefully looked after by the resident physician or under his direction, by the attendants of the hospital. During the day the physician was in constant attendance and from nine o'clock in the evening until six o'clock the following morning an officer was given charge of the hospital. The nurses are inmates who work under the direction of the physician. From the outset, the following method was employed in disposing of dejecta from the patients. Each stool was dosed with chlorinated lime and a one to forty solution of carbolic acid. It was allowed to stand for a period of one hour, after which time it was emptied into the sewer through a hopper in the bath-room. After each stool was emptied, the hopper was dosed with creolol, which is a disinfectant preparation containing 15 per cent. carbolic acid. Boiled water only was served to the patients and used for all general purposes about the hospital, except for flushing purposes in the bath-room.

The above method of disposal of dejecta from the typhoid patients was followed in preference to carrying out the stools and burying them, as this latter method would have entailed their conveyance through all of Ward C and thence along the main corridor, past the dining-room and kitchen, into the enclosure, and in all probability outside the enclosure, to a convenient spot, a minimum distance of nearly a quarter of a mile. It was believed that the method pursued was decidedly safer.

In order to determine, if possible, the source of infection of the typhoid fever cases, a careful investigation was conducted and any probable source of infection thoroughly looked into. A study was consequently made of the daily life of the inmates, a summary of which is hereinbefore set forth, the sewerage system, the water system, milk, food and ice supplies, a possible foreign source, such as an infection due to flies or carriers in the person of newcomers to the Institution, and an analysis of the results obtained from tests of the water and milk supplies of the Institution. The result of all of this caused certain corrective measures to be taken, some of which are only temporary expedients and others of a more permanent nature. In the latter class are certain preventative measures which will be suggested for permanent installation. At the outset of the investigation, a careful study was made of the record of each case. The following is a list of all cases occurring during the year, and relevant data in connection therewith.

Typhoid Fever Cases at Huntingdon Reformatory. Dr. Smith's Record.

Name.	No.	Taken to Hospital.	Drinking Water.	Works in:	Cell.	Ward.
Hoffman,	6527	June 15,	Reservoir water,	Brick shop,	330	B
Lutz,	6884	July 25,	Cooler in guard room,	Cage boy,	107	D
O'Connor,*	7130	July 28,	Spring water (cell),	Paint class,	227	C
Tomlin,	7166	July 29,	Reservoir and river water,	Ward C,	336	C
Everts,	6997	Aug. 14,	Reservoir and river water,	Ward C,	300	C
Kinley,	6880	Aug. 14,	Reservoir water,	Band,	218	B
Bowman,	6963	Aug. 15,	Spring at barn and reservoir water,	Farm,	426	D
Dickson,	6435	Aug. 17,	Reservoir and river water,	Paint class,	433	D
Garinger,	7036	Aug. 17,	Spring house at farm and reservoir water,	Farm,	135	D
Lewis,	6785	Aug. 19,	Well on island and river water,	Island,	229	D
Dailey,	6828	Aug. 23,	Well in yard and reservoir water,	Tin shop,	231	D
Boyer,	7035	Aug. 25,	Reservoir water,	Paint class,	328	D
Monhart,	7256	Aug. 25,	Reservoir water (cell and shop),	Blacksmith shop,	235	C
Vall,	6726	Aug. 26,	Reservoir water (cell and shop),	Carpenter shop,	339	D
Laney,	6831	Aug. 27,	Reservoir water (cell), spring at quarry,	Stone quarry,	140	B
Shields,	6850	Aug. 27,	Spring reservoir water (cell and office),	Florist,	407	D
Leef,	6937	Aug. 26,	Spring reservoir water cellar Supt. residence,	Printing office,	258	D
Miguski,	6882	Aug. 29,	Spring reservoir water (cell and office),	Carpenter shop,,	239	D
Irwin,,	6776	Aug. 29,	Spring reservoir water from cell,	Ward D (cell house),	358	D
Hoover,	6471	Aug. 29,	Spring reservoir water (hospital),	Nurse in hospital,	Hosp.	A
Latshaw,	6763	Sept. 1,	Spring reservoir water (cellar) Supt. residence,	Florist,	232	D
Krause,	7021	Sept. 2,	Spring reservoir water (cell and shop),	Sign painting class,	467	D
Prockmier,	7248	Sept. 3,	Spring (cell and kitchen),	Kitchen,	144	C
Thompson,	7118	Sept. 6,	Spring (cell and kitchen),	Kitchen,	144	C
Purdig,	6670	Sept. 21,	Spring water in hospital,	Nurse in hospital,	Hosp.	A
Nagle,	6461	Sept. 23,	Spring in cell and shop,	Carpenter shop,	233	D
Pershka,	7189	Oct. 2,	Spring in cell and shop,	Machine shop,	115	C
Michaels,*	6767	Oct. 7,	Spring in cell and kitchen,	Cold storage,	108	D

*These two patients died; all other patients recovered.

At the Mason farm the attention of the householders was called to the necessity of preventing as far as possible pollution of the spring water supply. A leaky pump drain was removed and a tight tile drain substituted into which is discharged the kitchen and laundry waste from the house. The privies on the premises were of the surface type. This was remedied by substituting boxes under the privies which can be periodically removed. The pigyard has been supplied with a drain discharging into a small surface stream, the water from which flows around the reservoir. At present the underground drainage from the barn-yard alone remains uncared for. At the spring house an unused suction pipe extending into the spring, and formerly connected with a pump placed along the roadway outside the springhouse, was removed; and the dry well along the roadway through which this suction pipe extended up to the surface of the road and connected with the pump was thoroughly concreted on the inner surface of the well and filled in with earth. New drains were placed across the road opposite the spring house and every precaution thought of was taken to protect the spring from road drainage.

Water, Ice, Milk, and Food Supplies.

The next step was a scrutiny of the results of analyses of the test samples taken about the Institution. These results here follow:

First-Set—collected by Dr. Frontz—Received August 8th.

	Bacteria in c. c.	B. Coli in c. c.
No. 1 Cell No. 300, Cell House C.,	1	0
No. 2 Cell No. 107, Cell House D.,	4	0
No. 3 Broken,		
No. 4 Cell No. 219, Cell house C,	0	0
No. 5 Cell No. 330, Cell house B,	4	0
No. 6 Kitchen Gen. Supt. Res. (dead end),	4	0
No. 7 Reserve reservoir on Hill (spring water),	16	0
No. 8 Boiler house (spring water),	24	0
No. 9 Reservoir No. 1,	22	0
No. 10 Reservoir No. 2,	1,000	4

Second Set—Collected by Dr. Smith—Received August 23rd.

	Bacteria in c. c.	B. Coli in c. c.
No. 1 From reservoir—upper side,	700	8
No. 2 Reservoir at spring next reformatory,	16	6
No. 3 Spring house at farm barn,	18	0
No. 4 Well on Island,	1	0
No. 5 River water taken opposite pump house,	1,500	60
No. 6 River water from spigot in paint class,	200	2
No. 7 River water tool house, Ward C,	100	16
No. 9 Melted ice from kitchen,	260	0
No. 10 Milk from kitchen,	132,000	1,700

The water works system was carefully looked over and a third set of water and milk samples was procured on Monday, September 5, and sent to the laboratories for analysis, the result of which herewith appears:

Third set—Collected September 5th.

	Bacteria in c. c.	B. Coli in c. c.
No. 1 Reservoir No. 1 (next reformatory),	36	2
No. 2 Reservoir No. 2 (upper basin),	52	1
No. 3 Main spring (spring house at reservoir),	26	2
No. 4 Spring feeding and along side reservoir No. 2,	24	0
No. 5 Spring (cor. reservoir lot), feeding basin No. 1,	156	3
No. 6 Big spring Juniata R. 1½ m. up,	420	18
No. 7 Quarry spring,	480	6
No. 8 Spring milk house—farm barn,	94	8
No. 9 Milk at farm,	88,000	2,400
No. 10 Milk at cold storage,	84,000	3,000
No. 11 Reserve reservoir,	40	1
No. 12 Tap—Spring water supply kitchen,	8	0

The samples of water sent to the laboratories, upon analysis, showed the presence of bacterial pollution in both the spring and river water. The pollution in the river water is readily accounted for. The Juniata river above the Reformatory intake has on its water-shed of nearly 1,000 square miles a number of good sized towns and one city. These municipalities are, in several instances, discharging raw sewage into the river or its tributaries, the nearest being the borough of Tyrone, about 15 miles up stream. The bacterial pollution in the spring water supply is not so easily accounted for. A possible source of contamination however lies in under-ground drainage from the barnyard at the Mason farm.

At the outset, as a safeguard, it was decided to treat all of the water going into the Institution with a germicide and to boil all the water used for drinking purposes. Consequently, on Sunday evening, September fourth, the supply of spring water from the collecting reservoir was shut off, and the water in the pressure reservoir near the Institution was treated with copper sulphate at the rate of one part in a million. The sulphate was dissolved in water and the solution applied to the surface of the water in the pressure reservoir. There were in the reservoir at this time approximately 200,000 gallons of water, only a small part of which was used during the night. This water was served to inmates until eight o'clock on Monday, the 5th of September, when the entire supply of spring water was shut off until noon at which time it was turned on for about one hour; after this it was again shut off and not turned into the system until six o'clock the same evening It was shut off for the night at eight o'clock. This routine was followed during the whole period of investigation, and beginning with noon on Monday, September 5th, boiled water was served to all the inmates in their cells and at the present date is still supplied.

The supply in the pressure reservoir was sufficient to run the Institution until Tuesday, September 6th, on which date the spring water supply in Basin No. 2 at the Mason reservoir was dosed with copper sulphate at the rate of one part in a million. The dosing was finished about 3.30 p. m., on Tuesday and this water then stood in the basin until 6.00 p. m., at which time the pump at the Institution was started and the pressure reservoir again filled with a supply of this dosed water.

The plan followed thereafter, and in use at the present date, was to dose the water only in Basin No. 2, allowing the undosed water to collect in Basin No. 1 and flow thence through the connecting pipe in the division wall into Basin No. 2, placing the copper sulphate in a wooden box set over the end of the 6 inch connecting pipe. The amount of water flowing through said pipe was ascertained and the necessary amount of the chemical was placed in the dosing box to treat this water at the rate of one part in a million, this rate being used on Tuesday, the 6th, and Wednesday, the 7th. On the 9th of September, the rate was reduced one half, or at the rate of one part in two million parts, this amount being used thereafter up to the present time. At no time was water pumped from Basin No. 1, which was contantly kept as a further water supply, except that on September 14th a chemical was added to this basin in order to try the effect on an algae growth therein. From this time, however, the former routine was continued. As a result of the above, all of the water for domestic purposes entering the Institution first received a treatment of copper sulphate and in addition, all the drinking water supply was boiled. After the Department's officer left the Institution this water treatment was carried on by a responsible officer of the Reformatory under explicit written instructions.

On Thursday, September 8th, the river water was first dosed, the chemical being applied to the water in hourly doses in the pump well at the river pumping station at the rate of one ounce of copper sulphate in solution once every hour which is equivalent to a rate of one part to two and a half million. This water was dosed from 5.00 a. m. to 8.00 p. m. each day, during which time the draft on this system is at its maximum and after which time very little river water is used, except in the boilers. In fact, there is practically no other use of the river water except for flushing purposes in the sanitary sewer system during the hours of the night.

The milk used in the Institution is all obtained from the Reformatory dairy. At the time of the investigation 13 milch cows were kept at the farm. Great care is exercised in keeping the stables in a sanitary condition. The floor of the cow stables is of concrete and at the rear of each stall extends a gutter through which all drainage from the stables finds its way into a manure pit in the yard outside. River water is used about the barn for flushing purposes, the cattle are kept clean and the stable thoroughly scrubbed at frequent intervals. The milking is done by inmates of the institution under the supervision of the officer in charge of the farm and before milking, the milker is obliged to thoroughly wash his hands, and also to wash the cow's udder. A straining cloth is placed over the top of the milking bucket and the milk collected is carried into the milk-room, where it is again strained and passed through an aerator, which consists of a conical shaped tin receptacle which is first filled with water and the milk is then allowed to trickle down over the sides, in this manner being partly cooled and aerated. After leaving the aerator it is placed in the milk cans, which have previously been washed in the kitchen at the Reformatory and thoroughly cleaned with hot water, and sent up to the farm. The milk in these cans is conveyed to the Reformatory and immediately placed in the cold storage building, remaining here until used. The water used about the barn in preparing the milk for use is, as previously stated, obtained from the small spring located on the farm near the barn.

The samples of milk taken and analyzed showed the presence of B. Coli. When the river water was still being used in the kitchen, this source of supply was drawn upon at times for the washing of milk cans, the water, however,. presumably having been boiled before being thus used. After the river supply was cut out of the kitchen, only the spring water supply was used in cleaning these utensils. As a further precaution after the outbreak, the inmates assigned to do the milking were instructed upon their arrival at the farm to submit the milk cans which they carried to the officer in charge for his inspection. This was intended as a check against insufficient cleaning.

A rigid inspection of the stables and the methods followed in milking and in storing milk at the Institution failed to reveal any direct source of contamination. Notwithstanding care exercised, all of the milk samples taken, on analysis, showed the presence of B. Coli. The first sample taken by the resident physician was procured at the kitchen after the milk had been placed in cold storage. The second set of samples were procured, one at the farm and the other from a portion of the same morning's milk which was carefully set aside and placed in the cold storage at the Reformatory; this method being followed in order to check a possible source of contamination either at the farm or in the handling of the supply at the Institution. All three samples, however, showed B. Coli, the number slightly in excess of the sample taken from cold storage.

A possible solution of the presence of bacterial pollution in the milk is in the arrangements that obtained in the small spring house at the farm. It is believed that this pollution was carried into the floor of the spring house on the shoes of persons entering the same, later on finding its way into the spring, owing to the fact that there was no protection against this in the shape of a ledge alongside the water channel. In scrubbing the floor of the spring house also it was necessary to mop it up, due to the fact that there was no drain in the floor. It would be easily possible for dirt in this manner to find its way into the water and later on to find its way into the milk house. This condition of affairs has been corrected by the placing of a ledge along the water channel and a drain for the floor.

As to the use of milk by the inmates it appears that this article of diet is supplied as a rule once or twice a week and used generally with boiled rice or some other cereal. The same supply is used daily by the Superintendent of the Institution and his family, as well as by the officers who take their meals in the Reformatory. Among the latter, one case of typhoid fever occurred, the patient in this instance being a man who resided in the Borough of Petersburg, about four miles up-stream from the Reformatory.

The ice supply for the Institution has been obtained for the last two years from the collecting reservoir at the Mason farm. A few years ago an ice pond was built outside the wall and on several occasions prior to two years ago ice was taken from the pond. As a matter of fact, however, the inmates are not served with ice water and according to reports with but one or two exceptions, never have access to any of the ice coolers, water from which is used exclusively by the officers. A sample of water derived from melted ice, upon analysis, showd no B. Coli.

The inmates are served with good wholesome food, carefully prepared, all receiving their meals in their cells except those living in Ward D, these latter comprising, on an average, 30 per cent. of the total number. The food is delivered to the cells by "trustees' and carried around on small wagons. Practically all the vegetables that are used are raised on the island farm, the upper end of which is occasionally inundated but only during the winter season. Irrigation is not used at all on this island nor is night soil ever used as a fertilizer. The vegetables, with possibly the exception of tomatoes, are served to the inmates after being cooked. It is possible, however, for the inmates working on the island and about the farm occasionally to secure raw vegetables such as turnips and these might be smuggled into the building and passed on to other prisoners. Fresh fruit is served in season, consisting of bananas, cantaloupes, water-melons and apples, the first and last articles being those commonly used, and the apples as a rule are baked. The apples are secured generally from farmers residing in the vicinity of the Institution.

A daily record of the food served the inmates is kept and that used in the time which would probably mark the incubation period of the greater number of the cases has been secured from the records and is appended to and forms a part of this report.

As to the possibility of the infection arising from the presence of typhoid among the newcomers, an inspection of the record of cases shows that all of the boys contracting the disease had been in the Institution at least three months prior to the onset. In this connection there remains the possibility of one or more of the inmates being a typhoid fever carrier, who, being employed in the kitchen, might possibly have served as a source of infection through the medium of the food supply. Definite information along the line was not secured.

It developed upon investigation that in the immediate neighborhood of the Institution, in the village of Smithfield, two cases of typhoid fever had occurred, the onset in each case being some time prior to the severe outbreak in the Reformatory. Definite information was secured relative to the case of a boy named Brown, a child of one of the officers of the Institution. He had been ailing for sometime prior to the date on which he took his bed, at which time the disease was pronounced typhoid fever. Prior to that time no particular attention was paid to the dejecta from this patient, he making use of the privy on the premises which is of the open vault type. As soon, however, as the case was pronounced typhoid fever, the patient's stools were properly disinfected and buried.

The bath-house might be mentioned as an additional possible source of infection. There are in this building 40 shower baths and about 100 inmates bathe daily, all of the prisoners being required to bathe at least once a week, the greatest number using Friday and Saturday for this purpose. The supply of water for bathing is obtained from the river and before emerging at the showers part of the supply is heated at the boiler house and passes into a water mixer, here being met by a supply of cold water. After being thoroughly mixed it leaves the mixer at the proper temperature and passes thence to the showers. A large amount of water is used for this purpose and it is claimed by the authorities that there is not a sufficient quantity of the spring water to enable them to turn this supply into the bath room and exclude the river water therefrom.

Discussion.

A careful analysis of the records of the cases of typhoid fever occurring in the Reformatory during the summer fails to reveal any single source of infection. Out of a total of 28 cases, however, 9 of the patients are known to have used water other than from the spring supply. Four of the inmates taken sick admitted that they drank Juniata river water, which is known to be polluted. The State records show that from April until the middle of September 51 cases of typhoid fever occurred in the city of Altoona, located about 30 miles up stream from the Reformatory. In addition to these cases there were undoubtedly other cases on the watershed. Two of the boys who worked about the farm drank water coming from the small spring used to supply water to the milk house. This, upon examination, showed bacterial pollution. There are no records of any cases of typhoid fever occurring on the farm for a number of years. One patient drank water from the spring at the Institution quarry, water from which upon analysis showed the presence of B. Coli. Of the two remaining from the nine cases, one drank ice water from the cooler in the officer's room, the ice supply, however, upon analysis showing no bacterial pollution, and the other used water from a well on the lawn outside the enclosure. This water was not analyzed but the well has been abandoned.

Two of the cases were probably of secondary origin, these patients both being nurses in the hospital, one of whom had been nursing for three or four weeks prior to the onset.

Of the remaining 17 cases, all of which are supposed to have used only the spring water, 14 had direct access to a supply of river water in their daily toil in the shops and about the grounds and buildings. Two of the remaining three worked in the kitchen and the other was a member of the band and in all possibly had an opportunity to get river water.

Finally, all of the boys use river water for bathing purposes. Shower baths are used for this purpose and river water could easily find its way into the system while the boy is bathing. Possibly in case of thirst the inmate might drink some of this water, not realizing the danger attendant thereon.

While the spring water which is generally used, upon analysis showed bacterial pollution, yet no cases of typhoid fever have ever occurred, according to reports, on the Mason farm located alongside the reservoir. The presence of B. Coli in this reservoir water is probably due to drainage from the barnyard at this farm reaching the springs by way of underground channels. A survey of the farm premises and the reservoir indicates that the water entering the reservoir through the springs has its origin northeast of the reservoir and up the hillside and back of the buildings. Measurement of the water levels in the springs and the wells at the Mason farm shows that from the upper well at the Mason farm to the lowest spring there is a constant lowering in the water level, corresponding in a general way with the slope of the surface of the ground, which is from the farm buildings towards the reservoir. Furthermore, it is stated that the lower part of the barnyard lying along the highway was formerly quite swampy. This has been filled in, however, and it is thought that most of the surface water drains off through the road ditch. Underlying the barn-yard area is an open seam sand rock formation, with the rock standing almost vertical, through which surface water probably finds its way into the ground water and at a lower point emerges through the springs into the reservoir.

Another striking feature of the present water works system is the practice of serving the inmates with their drinking water in the various shops by means of spring water carried into the buildings in buckets, while the river water is introduced into the same buildings through a pipe system. There is thus a temptation to drink the river water, which is likely to be cooler when coming out of the taps, than the spring water which has been standing in buckets, notwithstanding the fact that warning signs have been placed at the river water taps. This danger would probably be eliminated if the spring water supply were also piped into the various buildings and to points to which the inmates are accustomed to resort for their drinking water. The practice of dipping up with cups the spring water from the buckets is dangerous and might easily be a means of communicating infection.

Any connection between the two water works systems is inadvisable. Three of the former connections have been removed and but one now exists through the valve underneath the machine shop. The only use, it is claimed, for this connection is in case of a break down in the pumps at the river, to admit a supply of spring water into the river water distribution system temporarily until repairs can be made. It is said that river water has never been allowed to pass through this valve into the spring water distribution system. However, if after the valve has been opened as it was in the early spring of the current year, when it was again closed it failed to seat itself properly, with the pressure of the pumps behind the river water some of this might possibly get through into the spring water distribution system and in this manner be unwittingly served to the inmates with disasterous results. In order to guard against such a contingency it was recommended to the authorities that a check valve should be placed in the pipe line on the side of the valve connecting with the river water distribution system, so that by no possibiity could river water find its way into the spring water distribution system. Owing to a pressure of work this valve has not yet been installed, but its installation is contemplated in the near future.

This was suggested as a temporary expedient only. It is extremely desirable that these two supplies should be disconnected wholly and the chance of their mixing be entirely eliminated.

There should be duplicate pumping machinery at the river pumping station and there should be duplicate mechanical filters with all modern appliances installed at the same place. The filtered water should be stored in two places. The first in a clear water well under the filters and this would serve as a pump well besides. There should be a storage tank or reservoir located on the Institution grounds at a high enough elevation to afford ample pressure for fire streams and the Board of Managers should employ an expert engineer to work up the details for such system and to prepare estimates of cost. The plans should be approved by the State Department of Health and this system of filtered river supply should be independent of the pure spring supply used for superior purposes. With a duplicate pumping and filtering plant the amount of stored filtered water need be only enough to supply the night consumption and to furnish water during the first part of a conflagration.

The use of river water for bathing purposes and in the laundry is attended with more or less peril owing to the sewage pollution of the river. At both places large quantities of the river water is used. By the use of filtered water in the laundry and for bathing purposes the present spring supply for drinking purposes should be ample.

Recommendations.

On December 17th, 1910, the Commissioner of Health determined that certain changes and improvements should be made to the water works system in order that the water supplied to the Institution shall not be prejudicial to public health, and he sent a written report to the Board of Managers at the Reformaory, making the following recommendation:

First. Separation of the spring water suppy for drinking and culinary purposes from the river supply, the latter to be used for laundry, bathing and inferior uses of the Institution.

Second. Protection of the spring supply at the storage reservoir from all contamination from barnyard drainage by the construction in the barnyard of the Mason farm of a large water tight concrete manure pit and the use of it in such a manner as to protect the purity of the ground waters leading to the springs which feed the reservoirs and such further improvements at the stalls in the barn and elsewhere as to conduct all manure drainage into said pit.

Third. The installation of a duplicate pumping and mechanical filter plant for the treatment of the river water and in this connection the erection of a storage tank in substantial accordance with the directions hereinbefore given. The plans for these improvements to be submitted to and approved by the Commissioner of Health.

Fourth. The piping of the spring water throughout the Institution and the abandonment of the present bucket system of serving this water to the inmates.

Fifth. The prohibition of the use of the river water for drinking purposes.

Sixth. The thorough screening of the kitchen and dining room and any place used for the storage or preparation of food.

Diet List. Pennsylvania Industrial Reformatory, Huntingdon, Pa., 1910.

July 24	B.	Boiled rice, sugar, milk and coffee.
	D.	Salt pork, baked beans and coffee.
	S.	Bologna, apples, tea and sugar.
25	B.	Baked apples, sugar and tea.
	D.	Boiled beef, pea soup and potatoes.
	S.	Butter, onions and coffee.
26	B.	Stewed prunes, sugar and coffee
	D.	Beef pot pie and potatoes.
	S.	Boiled beef and hominy, coffee.
27	B.	Stewed apples, sugar and coffee.
	D.	Salt pork and baked beans.
	S.	Boiled beets, sugar and coffee.
28	B.	Beef and barley stew and coffee.
	D.	Boiled beef, new beans and potatoes.
	S.	Bananas and coffee.
29	B.	Stewed apples, sugar and coffee.
	D.	Baked codfish, mashed potatoes, dressing.
	S.	Bologna, onions and coffee.
30	B.	Stewed raisins, sugar and coffee.
	D.	Boiled beef, cabbage and potatoes.
	S.	Beef and vegetable stew, coffee.
31	B.	Baked apples, sugar and coffee.
	D.	Salt pork, baked beans and coffee.
	S.	Cinnamon cake, tea and sugar.
Aug. 1	B.	Beef and barley stew, tea and sugar.
	D.	Boiled beef, pea soup and potatoes.
	S.	Bologna, onions and coffee.
2	B.	Oatflake, sugar, milk and coffee.
	D.	Boiled beef, cabbage and potatoes.
	S.	Boiled beets, sugar and coffee.
3	B.	Baked apples, sugar and coffee.
	D.	Salt pork and baked beans.
	S.	Boiled beef and macaroni, coffee
4	B.	Stewed peaches, sugar and coffee.
	D.	Beef and vegetable stew.
	S.	Corn on ear and coffee.
Aug. 5	B.	Beef and rice stew, coffee.
	D.	Baked codfish, boiled beef, potatoes, dressing
	S.	Bologna and coffee.
6	B.	Stewed raisins, sugar and coffee.
	D.	Boiled beef and vegetable soup.
	S.	Onions, boiled potatoes and coffee.
7	B.	Beef and rice stew and coffee.
	D.	Salt pork, baked beans and coffee.
	S.	Bananas, pears, tea and sugar.
8	B.	Stewed peaches, tea and sugar.
	D.	Boiled beef, pea soup and potatoes.
	S.	Bologna and coffee.
9	B.	Baked apples, sugar and coffee.
	D.	Boiled beef, cabbage and potatoes.
	S.	Beef and boiled hominy, coffee.

10 B. Beef and rice stew, coffee.
D. Baked beans and salt pork.
S. Stewed peaches, sugar and coffee.

11 B. Stewed prunes, sugar and coffee.
D. Beef and vegetable stew, potatoes.
S. Boiled beef and macaroni, coffee.

12 B. Stewed apples, sugar and coffee.
D. Baked cod, new potatoes and dressing.
S. Bologna and coffee.

13 B. Stewed peaches, sugar and coffee.
D. Boiled beef, new beans and potatoes.
S. Boiled potatoes, onions and coffee.

14 B. Beef and barley stew, and coffee.
D. Salt pork, baked beans and coffee.
S. Bananas, ginger snaps, tea and sugar.

15 B. Stewed prunes, tea and sugar.
D. Boiled beef and cabbage, potatoes.
S. Corn on cob and coffee.

16 B. Baked apples, sugar and coffee.
D. Mutton pot pie and potatoes.
S. Bologna and coffee.

17 B. Stewed prunes. sugar and coffee.
D. Salt pork and baked beans.
S. Boiled beef and macaroni, coffee.

18 B. Stewed apples, sugar and coffee.
D. Boiled beef and string beans, potatoes.
S. Boiled beets, sugar and coffee.

19. B. Beef and barley stew, coffee.
D. Baked fish, potatoes and dressing.
S. Fried cabbage and coffee.

20 B. Baked apples, sugar and coffee.
D. Boiled beef, string beans and potatoes.
S. Bologna and coffee.

31. TYPHOID FEVER AT THE VILLAGE OF LIME RIDGE, CENTRE TOWNSHIP, COLUMBIA COUNTY.

At the same time that typhoid fever was being combated by the State Department of Health in the Wyoming Valley, Luzerne County, the disease broke out in the village of Lime Ridge, Centre Township, Columbia County. The Commissioner of Health instructed the County Medical Inspector, Dr. S. B. Arment, of Bloomsburg, to render necessary medical assistance, and directed the Chief Engineer to make a sanitary inspection of the village, to run down the origin of the outbreak and to stamp out the infection. Officer W. R. Teats and Inspector H. C. Beckley were sent to Lime Ridge from Wilkes-Barre. Later, the Commissioner of Health instituted a temporary hospital under the superintendency of Miss Alice O'Halloran of the Department. All told, at the end of October there had been 60 cases of typhoid fever in Lime Ridge and vicinity and 9 suspicious cases. The following is a report of the operations of the Engineering Divisions:

General Conditions.

The village of Lime Ridge is located in Centre Township, Columbia County, about midway between Bloomsburg and Berwick, and between the Dalaware, Lackawanna and Western Railroad and the Susquehanna river, or about 7 miles north of Bloomsburg, the county seat of Columbia County. The population is about 250 composed mostly of a laboring class who find employment largely in Bloomsburg and Berwick. A few are employed in a lime quarry which is located near the village. The village consists of 83 private dwellings, 2 general stores, the Delaware, Lackawanna and Western station, 2 churches, a hall and a hotel.

Messrs. Teats and Beckley arrived in Lime Ridge in the afternoon of September 9th. From Mr. Teats report the following quotations are made:

"We immediately started a house to house census. Most of the cases were found in the northern portion of the village. Taking into consideration the fact that they had not all used one water or one milk supply, we concluded that the infection must have come from one certain thing the sick ones had drank or eaten. The meat supply was not suspected because of the fact that many had not eaten fresh meat for months, while those who had eaten fresh meat had obtained it at several different places. The milk appeared to be eliminated by the fact that it was procured from eleven different sources. The water was eliminated by the fact that the citizens procured their supplies from 42 different wells scattered throughout the village.

"After 21 of the patients had been interviewed it was found that they had all eaten Jamison's ice cream. This was taken as a clue and an investigation at once started along this line.

JAMISON'S ICE CREAM ESTABLISHMENT.

Mr. Charles Jamison's property is located at the extreme northern end of the village. Every Friday during the summer he receives from a farm located near Espy, some 4 miles south of Lime Ridge, 30 to 40 quarts of milk and 10 to 15 quarts of cream. This is manufactured into ice cream on the following Saturday morning. It is sold to the villagers on Saturday and Sunday. Very nearly all of the people of the village patronize Mr. Jamison and either partake of ice cream on the premises or take it home to the family. Typhoid fever existed on the property. Mr. Charles Jamison, age 46 had been taken ill about the 4th of September and 10 days later his son, Hiram Jamison, 11 years old, was taken sick. The family physician did not pronounce either case typhoid fever. Dr. Arment secured specimens of blood from both the father and son and these were tested at the Department's laboratories. The result was negative for the father but positive for the son, thus proving that there had been typhoid fever at the Jamison home. The father's case was very suspicious and it is possible that he has an ambulant form of the disease. He was ill when the Department officers left Lime Ridge. Finding typhoid fever on the Jamison place suggested to the Department a further investigation, and the Unger farm from whence the milk and cream came every Friday as mentioned above, was visited. Mr. Teats has the following to say in his report about this farm.

"The Unger farm is owned by Mr. Merkle of Hazelton, Mr. Charles Unger being the tenant. This farm is located about one mile west of the village of Espy or about 4 miles south of Lime Ridge. The house and barn are located on the side of a ravine, the ground sloping very sharply toward the ravine. There is a small spring stream flowing through this ravine and pass the property on down to the Delaware, Lackawanna and Western Railroad, where it sinks into the fields. To the east about 20 feet distant from the house and beside this spring run is located the spring house. The water from the spring, which is located about 125 feet west of the spring house, is piped to the spring house. Just outside the super-structure there is a barrel which has been sunk into the ground and the pipe from the spring first enters this barrel and then is tapped off into the spring house. There is a pipe leading from the kitchen of the house to this barrel and this water is pumped into the kitchen for all domestic purposes. About 50 feet west of the kitchen door is a surface privy, which was in a very bad condition, the excrement flowing into the pathway leading to the house. Outside the kitchen door and extending toward the privy is located a long wooden bench where all milk cans and utensils are put to dry. Upon further investigation of this farm it was found that the wife of the tenant, Mrs. Chas. Unger, age 37, was taken ill about the first of August. Also that her daughter Blanche, age 6, was taken ill on September 8th, and that Truman, her son, was taken ill September 16th, but the family physician had not pronounced the cases typhoid fever. Feeling suspicious that this had been typhoid fever, we reported the matter and were instructed to have Dr. Arment take blood samples of the three persons. All three tests proved negative. Still feeling suspicious, and upon the advice of Dr. Fox of the Department's laboratories, another Widal was taken and each and all three proved postitive to the test, thus confirming the suspicions.

"Owing to the fact that it was impossible for Mr. Unger to procure a domestic or nurse to do the housework and care for the sick, this additional work fell upon him. His daily routine consisted of milking, cooking, nursing, making butter and general housework, and being ignorant of the nature of the disease, typhoid, no precautionary measures were taken whatever. The discharges from the three patients during all this time were thrown into the privy, which was overflowing and in bad condition and exposed to flies. Flies there were in plenty about the privy and about the milk utensils and the kitchen. The latter was not screened, neither was the spring house.

"Samples for bacteriological analyses were taken from the spring, of the improvised well and of the cooling trough where the milk was cooled. The first showed no B. Coli, but the third (cooling trough), showed 360 B. Coli. It would be possible for the milk to become contaminated from this polluted water. This cooling trough has been cleaned and purified and arrangements will be made so that a better supply can be pumped to the house. The privy has been moved and a new vault dug. The old vault has been disinfected and covered over with earth.

The Original Case of Typhoid Fever.

Mr. Unger had employed on his farm as a laborer, Mr. Frease Boone, age 38. Up to August 21st, as near as it could be ascertained, Mr. Boone took all of his meals at the Unger farm. When he was taken sick on September 8th, Mr. Boone had moved to a house nearby. Said Boone had quite frequently delivered the milk and cream to Mr. Jamison, the ice cream man at Lime Ridge. Mr. Boone's illness was not pronounced typhoid fever until October 2nd. The attending physician then said it was unnecessary to make a blood test since Mr. Boone undoubtedly had typhoid fever. Neither the Unger nor the Boone house was placarded. In searching for the origin of the infection at the Unger farm the investigation led to the adjoing farm at the head of the ravine. The following is quoted from Mr. Teats report:

"This is a dairy farm owned by Mr. William Hidley and conducted by his son-in-law, S. S. Davis. The farm and tenant house are located on very high ground. The property seems to be very well kept. The sanitary conditions were good. We were informed by Mrs. Unger and Mr. Davis that quite frequently during the summer they exchanged milk in the following manner—when the Ungers were short of milk, Davis furnished them with the desired quantity and vice versa. In the Hidley tenant house, where Mr. Davis lived, we found his son Carl Davis, aged 5, ill, but not pronounced by the doctor as typhoid fever. The Widal test taken on October 5th of Carl Davis and sent to Dr. Fox (the report received October 8th), gave positive results. This boy had been sick since September 26th. It was also learned that Raymond Webb, aged 13, had been employed by Mr. Davis to help on the farm. Raymond Webb complained of being ill on September 8th and went to his home about one mile north of the Davis property and was forced to take his bed on September 22nd. On September 23rd, Effie Webb, aged 8 years and a sister to Raymond, took ill and died on October 10th. On October 4th, Elmer Webb, aged 10, brother of Raymond Webb took ill. All were pronounced typhoid fever on October 1st. Although the house was placarded, no precautionary measures as to the disposal of the discharges were taken until October 4th. Orders were given by the State Department of Health and Form No. 2 was left at the house.

"The privy on this place was overflowing and in a very bad condition, and was within 50 feet of the kitchen door. Orders were given to make necessary changes.

"It was also learned that the mother of Mr. Davis, Mrs. Joshua Davis, age 71, who lived at Berwick, was taken ill with typhoid fever on July 10th 1910, and that her son, S. S. Davis had brought two or three quarts of milk to her two or three times a week. His pail had been handled and washed in the Davis house in Berwick, and some times had been left there until his next visit, when it was taken back to his home at the Davis dairy.

"A sample of the water on the Hidley farm where the cows were kept and the milk utensils were cared for, was taken on October the 2nd. This well is 83 feet deep, drilled through 60 feet of limestone rock. The analysis of this well shows 12,000 bacteria and 12 B. Coli. This well was ordered cleaned and disinfected. Mr. Hidley refused to comply with the Department's orders to sterilize all milk utensils and disinfect his well. Mr. Davis would come in contact with his own son, who had typhoid fever, and then handle the milk on the dairy farm. On account of these infractions of the orders of the County Medical Inspector, Dr. Arment stopped the sale of milk until the orders were complied with.

"The sale of milk and butter was also stopped on the Unger farm. Mr. Davis peddled milk through the village of Espy where there were two cases of typhoid fever. One case, Mr. Fred Long, age 28, used his milk and took typhoid fever on September 7th. The other case in this village can possibly be attributed to Lime Ridge, infection, where he had been on Labor Day, September 5th.

"All the above information was gained by Saturday, October 1st, 1910. With this knowledge, we visited the ice cream parlor of Charles Jamison, where we found ten gallons of ice cream ready for sale, the cream and milk having come from the Unger farm where there had been three cases of typhoid fever. We asked Mr. Jamison to destroy this batch of ice cream and sterilize all his utensils, which he very willingly did.

"A sample of the ice cream and of his well water were taken. The ice cream showed 360,000 bacteria but no B. Coli were found. The well showed 7,000 bacteria and 40 B. Coli. The well has been cleaned and disinfected and a new tight top put on the well."

In the public press of November 13th there appeared a statement by the Commissioner of Health relating how infected ice cream from infected milk was the cause of the outbreak of typhoid fever at Lime Ridge. In this widespread article the following statements were made:

"The epidemic began at Berwick, seven miles from Lime Ridge. An elderly woman in Berwick became ill with typhoid. During this illness she received milk several times each week from her son, a dairy farmer who lived four miles away. Each time he took the milk to his mother, the dairyman would take back home the cans he had previously left with his mother. Soon his dairy farm had developed typhoid.

"We will call him "Dairyman A," said Commissioner Dixon. He was in the habit of exchanging milk with a neighbor who we shall call "Dairyman B." When "A" was short of milk, "B" would sell him a supply, and vice versa. Thus a natural channel was formed for the transmission of the typhoid germs, and it was not long before "B's" wife and two children and also his hired man were suffering from the disease.

"It was especially unfortunate that none of the cases on either of these two farms was diagnosed as typhoid. No special precautions in handling the milk, therefore, was taken.

On November 17th Milkman Davis gave out a written statement to the Bloomsburg Morning Press, in which he claims that Dr. Dixon's statement as to the origin of the typhoid fever at Lime Ridge is false. He admits he is "Dairyman A" referred to by Dr. Dixon in the Lime Ridge article appearing in the public press of November 13th, but does not like the title, and declares that all the statements made in the article were not the facts. His public letter was as follows:

"Dr. Dixon:

"Dear Sir: I am the son of the elderly woman spoken of in Berwick, Samuel Davis, cowardly called "Dairyman A." The article as above written I declare a clean, clear, positive lie; never took a can of milk to Berwick or brought any away. In the early part of my mother's illness I paid her a short visit, at which time I took a two quart jar of milk along. The jar is remaining at their placed filled with fruit. The source you have received your evidence from is certainly on the bum, but will be no excuse whatever for you not answering for the false reports as you have submitted them.

"To be continued.

(Signed) "Samuel Davis."

The next day in the same publication followed a published list of 71 names of those who stated that Mr. Davis' milk never caused them any sickness or trouble.

From Mifflinville on November 21st, 1910, came the following communication from Dr. H. V. Hower, the attending physician in the Mrs. Joshua Davis case:

"Mifflinville, Pa., November 21st, 1910.

"Dr. Dixon, Harrisburg, Pa.

"Dear Sir: I have read your exhaustive statement in several papers concerning the source of infection in the Lime Ridge epidemic, and having been on the ground almost continuously and witnessing the efficient work of Messrs. Teats and Beckley in locating and shutting off of the trouble, it is with extreme reluctance and only because I am sure a great wrong is being (done) an absolutely innocent family by implying almost criminal carelessness, that I make the following statement. I attended the 'elderly lady' in Berwick, of whom you speak, during her illness from typhoid. Her case was reported, the home placarded and the nurse and family fully instructed as to the danger of infection, and the means of preventing it. I can honestly say that in my twenty-three years' experience as a physician, I have never found a family more willing and anxious to follow out to the last detail every suggestion offered regardless of the extra trouble and work caused thereby. The best evidence that these instructions were efficient and efficiently carried out lies in the fact that whilst there were eleven or twelve inmates in the house during Mrs. Davis' illness, not one of them contracted the disease. In addition to this, the wife of Dairyman No. 2 (Mrs. Unger), through whom you state the infection was brought to Lime Ridge, was taken sick a week before Mrs. Davis, thus showing positively that she could not have been infected from Mrs. Davis through milk cans brought from the Davis home by her son, (Dairyman No. 1). This son claims never to have left or brought a milk can from his mother's, but this is immaterial, as Mrs. Unger was taken sick at least a month too soon to have contracted it in this way. Mrs. Unger was taken sick, Dr. Arment informs me, August 1st. Mrs. Davis not until August 7th. I called Mr. Teats attention to this fact while he was at Lime Ridge, and I cannot understand how he could have conscientiously reported as he did. The story was a beautiful object lesson on infection, but it is not supported by facts. It almost seems as though in his zeal to have a complete chain of circumstantial evidence, and finding himself unable to follow the trail past the Unger family, your representative jumped a false scent and *made* the facts fit the case, instead of having a case made from the facts. Is it asking too much to request an investigation and correction of the statement referred to if you find you have been wrong.

"Very truly yours,
"H. V. HOWER,
Mifflinville, Pa."

The Commissioner of Health caused a further investigation to be made of the Mrs. Joshua Davis case and of its connection with the Lime Ridge outbreak. It was not necessary to show any relation between the two in order to account for the contamination of the Unger milk in time to have caused the Lime Ridge epidemic. Mr. Teats received the information at the Davis home, that Mrs. Davis was taken sick with typhoid fever on July 10th. This statement the family subsequently denied. The report given by Dr. H. V. Hower, attending physician shows the date of onset of Mrs. Davis' case as August 7th. Said doctor reported the case to the Board of Health of Berwick August 14th, on which date the house was placarded by the borough authorities. Dr. Hower's first visit to Mrs. Davis was on July 7th, at which time he says he found her temperature normal and it was normal on the 8th and 9th, but on the evening of the 10th her temperature began to go up, so he stated to the officer who made the re-investigation of circumstances. So it appears that Mrs. Davis was sick on July 10th and it seems entirely probable that they so reported to Mr. Teats. The doctor delayed his diagnosis of the case practically a month and he delayed reporting the case for a week after he had diagnosed it as typhoid fever. Officer Teats took the statements for granted that were made to him, and on this based his report. The opposition of Farmer Davis to conform to the regulations of the Department and the consequent necessity for shutting off the sale of his farm produce no doubt tended to injure his business and would call for a protest, if possible, from Mr. Davis. It is possible that there was no communication between Mrs. Davis' case of typhoid fever in Berwick and the fever on the Unger farm and her son's farm, but the fact remains that there was typhoid fever at both of these dairies and that the fever at the Unger dairy could have and in all probability did have a direct connection with the outbreak in Lime Ridge.

The Emergency Hospital.

Between September 7th and October 21st forty-one cases of typhoid fever developed in the village of Lime Ridge. There were a dozen other cases of mild illness not diagnosed as typhoid fever. The people were very much alarmed. In one home there were three cases in the family. In many other families there was much distress. The income was cut off in many instances, the head of the family being sick. Provisions had become scarce. The situation was critical and the danger of secondary infection so great that Mrs. Myron L. Lowe, of Lime Ridge, and the Commissioner of Health in co-operation with Dr. Arment, planned for the establishment of a temporary hospital. There being but one building available in the village, namely, that of the Patriotic Order Sons of America hall, permission was obtained to use this building for the purpose. Many of the members of this order took an active part in arranging for the reception of the patients. The Department's inspectors laid out a cesspool to receive the sewage from the hospital. A general call was issued for aid from the surrounding towns. The Berwick Steel Company furnished twenty-four cots. Supplies were secured in Bloomsburg and Berwick and by Friday night, September 30th, the hospital was receiving patients. The Commissioner of Health detailed Miss O'Halloran, chief nurse of dispensaries, to take charge and organize the nursing force into an efficient nursing body. Six nurses were at once secured. Saturday morning, October 1st, 21 patients had been removed from their homes to the hospital.

Subscriptions were taken in Bloomsburg, Berwick, Milton and other towns for the relief of the afflicted of Lime Ridge. The money was placed in the hands of a Relief Committee of Lime Ridge, of which Mrs. Lowe was elected treasurer. It is not too much to say that upon the initiative of Mrs. Lowe the hospital and general relief work was started and maintained.

Seven of the nurses were housed and taken care of by Mrs. Lowe in her own home, and a great deal of the soft diet was prepared by her for the patients in the hospital.

Sanitary Work.

Verbal orders warning the citizens to boil all water and milk were given from house to house by the Department's field ,inspectors on September 29th, the day of their arrival. They left Department circulars of instructions for the care of typhoid fever. Lime was provided in generous quantities by Mrs. Lowe. Under the direction of the Department officers, this was hauled throughout the village and used for disinfecting privy vaults and premises generally. It should be noted that secondary infection was almost absent, although the outbreak occurred during the fall season and conditions were unsanitary.

Every privy on the 84 properties in the village was disinfected. Five new vaults were constructed. Five wells were cleaned and disinfected, and three wells had new top platforms put upon them. Thirty-two of the houses where there was typhoid fever were disinfected. This work was done immediately after the patient was removed to the hospital. The garbage found in the yards was placed in piles and burned, and a general cleaning up of the whole village was accomplished. Dr. Hower devoted practically all of his time to ministering to the sick. The nurses labored under much personal inconvenience at the temporary hospital. Only three properties in the village were equipped with both tubs and closets. They drained to cesspools. No sewers were found. Excrement was deposited in privy vaults. Kitchen drainage and laundry water were emptied on to the surface of the ground. The soil being very porous, it quickly absorbed the liquids. Many of the privy vaults were found to be overflowing. Fly infection was possible.

Details of Water Supplies.

The water for domestic purposes was secured from forty-two private wells. Thirty-four were of the dug type, between thirty and forty feet deep, terminating near the limestone stratum, which underlies the region about forty-five to fifty-five feet below the surface. The other eight wells were of the drilled tpye, cased from the surface to a depth of about sixty-five feet, which takes the pipe well into the limestone rock. There are two springs along the river bank in the northern end of the village from which drinking water was procured during the summer.

The dug wells, prior to 1904, were never known to go dry. That year the Pennsylvania canal was drained dry and kept so. Since that time many of these wells are nearly dry and only contain sufficient water for use during the spring and winter months. This shows a ready communication between the waters in the ground at different points and indicates danger of pollution from privy vaults and barnyards in the village.

The artesian well, located on the John Shuman place, which is eighty-seven feet deep and thirty-five feet in the limestone, was found to be polluted. The conditions here are as follows:

Previous to 1906 he used the water from a dug well 33 feet deep. This is located at least 900 feet north of the canal, but when the water was left out of the canal, the water in the well entirely disappeared, and he was compelled to have the above mentioned artesian well drilled. Having no further use for the dug well as a water supply, he installed a bath and closet in the house and used the old well which is only 24 feet distant from the artesian well, as a cesspool. It is possible for the drainage from the cesspool to percolate into the artesian well by following down along the casing pipe. This matter was taken up with the owner who promised to abandon the old well as a cesspool and dig a new one a safe distance from the drilled well.

Samples were taken from twenty-one wells in the village where the water was most suspected. Thirteen of the wells showed no pollution, while the remaining eight showed B. Coli as follows:

Date of collection.	Sample.	Bacteria in 1 C. C.	
		Total.	B. Coli.
1910.			
Sept. 29	Well, William Rupert,	300	6
29	Well, G. E. Sponsler,	280	4
29	Well, Columbia Park,	2,700	10
29	Well, Edgar Rishe,	220	12
29	Well, Geo. Harp,	110	1
29	Well, Pierce Keiper,	1,920	4
29	Well, John Shuman,	170	32
Oct. 2	Well, Chas. Jamison,	7,000	40

Four of these wells showing B. Coli were found to have faulty covers. New tops were put on and the wells were cleaned and disinfected. Subsequent samples when analyzed showed no B. Coli. When the Department's officers left the village one well had not been cleaned. The well at Columbia Park was abandoned and a new one will be drilled before the park is opened again.

Milk Supply.

The milk supply in Lime Ridge was secured from eleven different sources, ten of which were owned by individuals and the people desiring milk came to their residences to get it. The only milk peddled is that by Mrs. John Splain, who lives on the Kocher farm near Fowlersville, Pa.

There was no sickness found on any of the properties where the above supplies were produced with the exception of Charles Jamison, who had sickness on his premises at about the time many of the others in the village took sick, having supplied milk to twelve of the typhoid fever patients. This milk was produced by two cows. It is possible that the milk and the ice cream were both responsible for the spread of the infection from the Jamison property. Especial attention was given to the Jamison well. The water was used by many residents and passers-by as the well is conveniently near the street and a glass is always at hand for use.

Of the forty-one cases of which a census was taken, two obtained milk from Wooley's, four used no milk, seven used Jamison's, four Splain's, three Haas's three Shuman's, four Shug's and the others used milk produced at more than one place.

Forty-one of the patients had partaken of ice cream at Jamison's.

Typhoid Fever Statistics.

In the following table are given typhoid fever cases reported or canvassed at Lime Ridge and vicinity, including Berwick and Bloomsburg boroughs. No connection was established between the cases at Bloomsburg and Lime Ridge. Four of the cases at Berwick were believed to have such connection, and fifteen in Scott township. With the forty-three cases in Centre township, two of which were not canvassed, there were at least sixty-two cases of typhoid fever attributable to the Lime Ridge epidemic.

Typhoid Fever Cases Reported or Canvassed in 1910 in Lime Ridge and Vicinity.

Month.	Townships.		Boroughs.		Total.
	Scott, including Espy village.	Centre, including Lime Ridge village.	Berwick.	Bloomsburg.	
January,	0	0	3	0	3
February,	0	0	4	1	5
March,	0	0	0	1	1
April,	0	1	0	0	1
May,	0	0	1	0	1
June,	0	0	0	0	0
July,	0	0	0	1	1
August,	3	0	5	4	12
September,	11	38	3	2	54
October,	1	5	1	6	13
November,	0	0	0	0	0
December,	0	0	1	0	1
Totals,	15	44	18	15	92

In the following table details of the sixty-two cases of typhoid fever connected with the Lime Ridge epidemic are given:

Typhoid Fever Cases Connected With the Lime Ridge Epidemic.

No.	Date of Onset.	Name of Patient.	Age.	Remarks.
		Scott Township.		
1	July 25	Irene Mills (Powles),	3	
2	Aug. 1	Mrs. Charles Unger,	37	
3	Aug. 23	Mrs. George Mills,	23	
4	Sept. 6	George Mills,	26	
5	Sept. 8	Blanche Unger,	6	
6	Sept. 8	Frease Boone,	38	
7	Sept. 8	Fred Lord,	28	
8	Sept. 8	Raymond Webb,	13	
9	Sept. 15	Mrs. Sam Peifer,	20	Not canvassed.
10	Sept. 15	Claude W. Sneidman,	20	Not canvassed.
11	Sept. 16	Truman Unger,	11	
12	Sept. 18	Harold Baker,	20	
13	Sept. 23	Effie Webb,	8	
14	Sept. 26	Carl Davis,	5	
15	Oct. 4	Elmer Webb,	10	
		Berwick Borough.		
1	July 10	Mrs. Joshua Davis,	71	Onset in doubt.
2	Sept. 22	Harry Nungesser,	35	
3	Sept. 22	Mrs. Harry Nungesser,	32	
4	Sept. 22	Laura Nungesser,	8	
		Centre Township.		
1	Sept. 7	Ruben Butterfield,	25	
2	Sept. 8	Mrs. R. M. Cain,	33	
3	Sept. 9	Mrs. M. C. Steward,	43	
4	Sept. 10	Mrs. C. H. Hettler,	23	
5	Sept. 11	Mrs. Elva Kemp,	19	
6	Sept. 11	Alvin Boone,	23	
7	Sept. 13	Lloyd Nungesser,	30	
8	Sept. 15	Hattie Weiss,	10	
9	Sept. 15	Hiram Jamison,	11	
10	Sept. 10	Jacob Boone,	14	
11	Sept. 18	Myron Boone,	47	
12	Sept. 18	Mrs. Wm. Ruppert,	47	
13	Sept. 18	Mrs. Mazie Harp,	21	
14	Sept. 18	Mrs. C. D. Bittenbender,	46	
15	Sept. 19	Floyd Breadbender,	46	
16	Sept. 19	Clara Bowen,	14	
17	Sept. 19	Elmira Gensil,	40	
18	Sept. 20	Mrs. Mary A. Rishe,	51	
19	Sept. 21	Eugene Steward,	10	
20	Sept. 21	James Boone,	4	
21	Sept. 21	Eber Ruppert,	23	
22	Sept. 21	Geo. Heaps,	16	
23	Sept. 21	Joseph Boone.	45	
24	Sept. 22	Fred Cain,	13	
25	Sept. 23	Arlena Boone,	7	
26	Sept. 23	Edna Cain,	15	
27	Sept. 23	Floyd Ruppert,	19	
28	Sept. 23	John W. Ruppert,	42	
29	Sept. 23	Eva Boone,	6	
30	Sept. 24	Annie Myers,	17	
31	Sept. 24	Maud Weiss,	13	
32	Sept. 25	Mrs. Alvin Boone,	23	
33	Sept. 25	Harry Bower, Jr.,	6	
34	Sept. 25	C. D. Bittenbender,	53	
35	Sept. 27	McClellan Heintzemann,	18	
36	Sept. 27	Bessie Boone,	10	
37	Sept. 28	James York,	16	
38	Sept. 29	Henry Fedder,	76	
39	Oct. 3	Jos. Steward,	26	
40	Oct. 10	Edna Shug,	19	
41	Oct. 10	Bessie Bittenbender,	28	
42	Oct. 3	Fred Wooley,	13	Not canvassed.
43	Oct. 17	Mrs. Sam Huber,	22	Not canvassed.

Of the 41 cases canvassed in Lime Ridge, twenty-one were males. In one family there were three cases, in nine families there were two cases and in twenty families there was one case only. This shows the effective work accomplished in preventing secondary infection in the village. By age periods, the patients are grouped as follows:

Age Period.	Cases.
1 to 9,	4
10 to 20,	17
21 to 30,	8
31 to 40,	2
41 to 50,	7
Over 50,	3
Total,	41

The cases include, seven laborers, ten housewives, thirteen children, four having no occupation and seven each having a different trade. The three cases of the Nungessers in Berwick were no doubt contracted while they were visiting the father's home in Lime Ridge where all three had been on Labor Day, September 5th. Harry Nungesser purchased one gallon of ice cream at Jamisons in the evening and took it to his father's home in Lime Ridge, and all ate it freely except the father and mother. Floyd Nungesser, brother of Harry, and the three Nungessers of Berwick contracted typhoid fever about the same date. The three Unger cases were in one house on the farm from which the milk and cream were sent to the Jamison ice cream parlor in Lime Ridge. Frease Boone worked on this farm all summer and no doubt contracted the disease there. Raymond Webb was employed on the Davis farm up to the time he took sick. His sister, Effie, visited the Davis and Unger farms. The case of the brother Elmer Webb was secondary. These three cases were in the same house. Fred Lord used the Davis milk. Harry Baker was known to have visited Lime Ridge on Labor Day. Carl's Davis's father distributed the milk through the village of Espy.

In the little hamlet of Almedia, Scott township, midway between Lime Ridge and Espy there were five cases of typhoid fever, although not so pronounced by the attending physician. The history of the cases is reported by Mr. Teats as follows:

"The adopted daughter of Mr. and Mrs. George Mills, Miss Irene Powles, aged three, took ill on July 25th at home (Mills' home). The doctor prescribed and left medicine and advised certain treatment for this little girl. About the time she was better, or on August 23rd, Mrs. George Mills, the mother of Irene, took ill. The doctor told her to continue and advised the same treatment as prescribed for Irene Powles. Mrs. Mills' illness continued on until September 6th when her husband took ill. He took the same medicine and treatment as his wife and daughter, Irene. The cases of Mrs. Mills and Irene Powles were not pronounced typhoid fever, but Mr. George Mills' case was pronounced typhoid fever by the attending physician and the house placarded.

"A sample of the water from the well on this property was taken on October 2nd, proved polluted as the following analysis shows:

"Sample No. 9. Bacteria, 160; B. Coli, 12.

"In the near vicinity of the above mentioned house, that of Mr. George Mills, lives Mrs. Samuel Peifer, age 22, who contracted typhoid fever on September 15th. She had not been away from home all summer. Close to the Mills' house lived Claud Sneidman, age 22, who contracted on September 15th, typhoid fever. Mr. Sneidman had been to Lime Ridge often during the summer and had eaten ice cream at the Park and probably at Jamison's."

Miss Clara Davis, who was employed in Creveling's grocery store in Almedia, where Mr. Claud Sneidman's father was also employed, is the daughter of Mrs. Joshua Davis, of Berwick, and the daughter visited her mother quite frequently during the mother's illness in Berwick, so it is reported. This is mentioned as a matter of history without particular reference or significance.

Conclusions.

The same physician was in attendance at the Unger farm, the Webb farm, the Mills house, the Sneidman and Peifer homes, the Lord home and the Baker home and he also had eight cases at Lime Ridge. In all these instances there was shown indifference to the rules and regulations of the State Department of Health. It is quite possible that if the proper instructions had been given and followed out on the Unger farm for the care of the discharge from the patients and in the handling of the milk, that the epidemic at Lime Ridge would not have occurred.

32. TYPHOID FEVER AT MT. JOY BOROUGH.

On September 15th, Dr. I. L. Mowrey, of Lancaster, County Medical Inspector for Lancaster County, reported to the Commissioner of Health, the prevalence of typhoid fever in Mt. Joy borough. He had found tweny well developed cases scattered within the borough limits. They appeared to be confined to one milk route, that of B. F. Kauffman & Son, the supply being purchased of Irvin Musser, of East Donegal township, so it was reported. A case of typhoid fever had developed at the Musser farm about the middle of August. The milk from the Musser dairy had not been supplied to the borough since the 12th of September. Dr. Mowrey spoke of a polluted nearby stream and of the borough's water supply as obtained from an open stream and supplied in its raw state to the consumers. Inspector W. W. Ritter, of the Engineering Division, was detailed to assist Dr. Mowrey in canvassing the cases and in causing abatement of nuisances. Inspector H. S. Kauffman was assigned to an inspection of the buildings on the watershed; Engineering Assistant, R. B. Styer, investigated the water works system and later, Assistant Engineer R. E. Irwin went to Mt. Joy and installed a hypo treatment plant and explained to the local authorities how to treat the water with a germicide. The following is a report of the operations of the Department.

General Conditions.

Mt. Joy borough is located in the northwestern part of Lancaster county on the main line of the Pennsylvania Railroad, twelve miles west of Lancaster city and twenty-four miles east of Harrisburg. The population is upwards of 2,100. The town is thrifty, the industries being the George Brown's Sons Cotton Mill, 150 employes; the Grey Iron Casting Company, 150 employees, and the Industrial Works, 50 employees.

Mt. Joy borough is drained by the Little Chiquesalunga Creek. This stream has its source in the Conewago hills in South Londonderry Township, Lebanon County about 9 miles north of Mt. Joy. The watershed is rugged and agricultural, comprising an area of 35 square miles above the water works intake just north of Mt. Joy borough and upon which there are 496 occupied properties, with a permanent population of 2,140 persons besides 1,200 horses, 2,700 cattle and 2,800 pigs. On the area are the villages of Milton Grove and Mastersonville. Milton Grove village in Mt. Joy township contains about 20 occupied estates and Mastersonville in Rapho township, has 33 habitations. The main creek flows through a rather thickly populated farming territory comprising fertile fields and numerous small tracts of timber land. The watershed was inspected during the first half of October and there were found to be 74 stream pollutions on 30 properties. There were three cases of typhoid fever on the shed in January of 1910 and one in October, distant about 2½ miles above the Mt. Joy intake. There were no stream pollutions on the typhoid properties. At the close of the year all of the stream pollutions found were reported abated with the exception of two.

The water works system was built in 1873. It now consists of a dam on the creek, a sedimentation basin adjacent thereto, also a pumping station, force main and distributing reservoir.

The dam, about 4 feet high, is constructed across the creek about 300 feet below the head race. The dam is 85 feet long and built of concrete. At the entrance to the head race an attempt is made to intercept leaves and twigs and other floating material, and a sluice is provided to facilitate the control of the flow of water in the race.

Between the race and the main stream there is a sedimentation basin 200 feet long, 135 feet wide at one end and 20 feet wide at the other end. The sides and bottom are paved with brick. When full to the flow line, the basin maintains 4 feet of water. It has an estimated capacity of 300,000 gallons; by arrangement of pipes, water may be drawn either from the sedimentation basin or from the tail race.

The pumping station is a stone and brick structure. There is a pump well 11 feet deep into which the water flows by gravity and from which it is raised by the pumps. There are two of the latter; one is a triple plunger pump operated by water power, estimated capacity of 384,000 gallons per day. A 50 horse power gasoline engine is set up to drive the same pump, if necessary, when a capacity of 1,300,000 gallons per 24 hours can be secured. The second pump is a Worthington, capacity of 1,300,000 gallons per 24 hours. From the station there is an 8 inch main rising to the distributing reservoir on the hill.

This reservoir is about one-half mile north of the borough. It is an earthen bank structure lined on the sloping sides and bottom with brick, is about 100 feet square at the top and 14 feet deep, and has a capacity of 750,000 gallons. It is elevated 133 feet above the pumps. The daily consumption of water in the town is 200,000 gallons or less. The pumping is usually done in the morning requiring from 5 to 6 hours, when steam or gasoline power is used and from 15 to 20 hours, when water power is used.

Typhoid Fever Outbreak.

There were 42 authentic cases of typhoid fever in Mt. Joy for 1910. Given by months, they occurred as follows:

May,	1
August,	6
September,	30
October,	3
November,	2
Total,	42

These cases were canvassed by the Department. The cases were, by age-period and sexes as follows:

Age Period.

Age.	Male.	Female.	Total.
0-4,	2	2	4
5-9,	2	4	6
10-14,	5	2	7
15-19,	2	4	6
20-24,	2	4	6
25-29,	1	1	2
30-34,	1	1	2
35-39,	4		4
40 and over,	1	4	5
Totals,	20	22	42

According to occupations, the patients were divided into 14 different classes as follows:

By Occupation.

At school,	10	In factory,	4	Mill,	1
Housewife,	8	Baker,	3	Retired,	1
Child at home,	5	Laborer,	2	Clerk,	1
At home, adults,	3	Printer,	1	Teamster,	1
Storekeeper,	1	Weaver,	1		

For the month of September, 25 of the cases occurred in the first two weeks and 6 cases in the next two weeks. The greatest number of onsets occurred on the 6th, 7th and 8th of September, totaling 9 cases. Twenty cases were divided among 7 families in five of which there were 2 cases each and in two of which there were 5 cases each. In every instance but two, out of the 42 cases of typhoid fever investigated, the patient received Kauffman milk produced on the Musser farm.

It is significant that in the townships of Mt. Joy and Rapho surrounding Mt. Joy borough, there were no cases reported to the State Department of Health for the summer and fall months and only one in East Donegal township for each month during the summer. So far as the Department has been able to ascertain the outbreak was confined to Mt. Joy borough.

General Discussion.

In the following table is given the date of onset, name of patient, address, age and occupation of the 42 cases of typhoid fever canvassed at Mt. Joy:

Date of onset.	Name of Patient.	Age.	Occupation.
May 5	Oliver Spickler, W. Donegal St.,	25	Laborer.
Aug. 10	Miriam Loraw, Marietta St.,	23	Wife.
Aug. 15	Herbert Frank, W. Main St.,	14	School.
Aug. 25	Mrs. Ella Garber, Lumber St.,	32	Wife.
Aug. 25	Earl Garber, Lumber St.,	9	School.
Aug. 25	Jas. Garber, Lumber St.,	11	School.
Aug. 28	Saml. S. Wilson, W. Main St.,	23	Printer.
Sept. 1	Wm. Hendrix, S. Barbara St.,	35	Cotton mill.
Sept. 1	Hannah Earnshaw, E. Main St.,	43	Wife.
Sept. 1	Clarence Kroll, Fairview St.,	13	School.
Sept. 2	John Zerphy, Manheim St.,	14	Factory.
Sept. 2	Helen Gibbins, E. Donegal St.,	6	School.
Sept. 3	Amelia Peeples, Lumber St.,	18	Factory.
Sept. 3	B. L. Garber, Barbara St.,	60	Retired.
Sept. 4	Mrs. Kate Berta, Main St.,	21	Wife.
Sept. 4	Howard Arnts, Mt. Joy St.,	15	Clerk.
Sept. 5	Mrs. Ismih Derr, W. Main St.,	53	Wife.
Sept. 5	Jacob Garber, Lumber St.,	33	Teamster.
Sept. 6	Theodore Kroll, Fairview St.,	3	Child.
Sept. 6	Elsie Kroll, Fairview St.,	11	School.
Sept. 6	Ada Kroll, Fairview St.,	4	Child.
Sept. 6	Frank Kroll, Fairview St.,	1	Child.
Sept. 7	Mrs. Elmer Gibbens, Marietta St.,	47	Wife.
Sept. 8	Ella Gantz, Manheim St.,	18	At home.
Sept. 8	John Gantz, Manheim St.,	23	Laborer.
Sept. 8	Peter Zerphy, Manheim St.,	9	School.
Sept. 8	Amos Hostetter, N. Barbara St.,	36	Tobacco dealer.
Sept. 10	Anna Hendrix, E. Donegal St.,	17	Factory.
Sept. 10	Mrs. Fannie Rahn, Main St.,	49	Wife.
Sept. 12	Ruth Yellets, Fairview St.,	14	At home.
Sept. 13	Catherine Ellis, E. Main St.,	8	School.
Sept. 13	Sarah M. Dillinger, E. Main St.,	7	School.
Sept. 16	Marie Garber, Lumber St.,	3	Child.
Sept. 20	Earla Bear, E. Main St.,	22	At home.
Sept. 22	H. W. Garber, Mt. Joy,	36	Baker.
Sept. 23	Fannie Himey, S. Barbara St.,	20	Weaver.
Sept. 30	Clyde Eshleman, W. Donegal St.,	14	School.
Oct. 1	R. G. Herlig, E. Main St.,	35	Baker.
Oct. 19	Gertrude Gibbons, Marietta St.,	5	Child.
Oct. 20	Mrs. Phillip Gibbons, E. Donegal St.,	28	Wife.
Nov. 1	Chas. Eshleman, E. Donegal St.,	19	Baker.
Nov. 22	Clara Arntz, Mt. Joy St.,	18	Factory.

Waste Disposal.

Mt. Joy does not have a public sewerage system. Outside privies and cesspools are used. Five of the properties where typhoid fever occurred had a cesspool only, at 10 of the other properties there was a privy vault fairly well protected from flies. The Department's typhoid fever circulars were distributed throughout the town where necessary. The public was warned to boil the water and milk. All nuisances were abated and new properties where typhoid fever existed were put in a sanitary condition.

Milk Supply.

B. F. Kauffman & Son supplied 100 families in Mt. Joy and secured their milk from Aaron Knissley, Monroe Sheafer, John Kraybill and Irvin Musser. These places were inspected and all found to be above suspicion, excepting that of Irvin Musser.

Irvin Musser is a farmer, residing in East Donegal township and owns nine cows. Up to September 12, he sold about fifty quarts of milk daily to Kauffman & Son. Mr. Musser gets his water supply from Nissley's run and a dug well. The well is located under the floor of the wash house which adjoins the kitchen. A box privy is twenty feet distant from the well A case of typhoid fever developed on the Musser premises on August 13, a hired boy, Howard Mumma, age 11 years. About two weeks later he was removed to his home in Florin, one mile distant. During his illness at the Musser home he was nursed by Mrs. Musser and the excreta were deposited in the box vault. Mrs. Musser assisted in milking the cows and washing the milk cans. On September 12th Grace Stokes, a hired girl, age 18 went down with the fever and on September 19th, Elias Musser, age 5, took the fever. Samples were collected from both water supplies and sent to the Department laboratories for bacteriological examination and showed the presence of B. Coli.

Amos H. Stauffer supplied about three hundred families. He had twenty-nine cows and got milk from four other farmers living nearby. All these places were visited and found to be above suspicion.

R. L. Gainer supplied 110 families and got his milk from Samuel Myers and Ezra Nye. These places were visited and found to be in good condition.

In the following table are given the results of analyses of milk.

Milk Analyses.

Date of collection.	Sample.	Bacteria in C. C.	
		Total.	B. Coli.
1910.			
Sept. 26	At Musser's,	24,000,000	1,000,000
26	At Stauffer's,	36,000	8,250
26	At Kauffman's,	35,000	3,150
26	At Gainer's,	300,000	3,000
26	At Gainer's,	180,000	100

The milk supply from the Musser dairy was discontinued on September 12th by direction of the County Medical Inspector.

Water Analyses.

In the following table is given the results of analyses of private well waters.

Private Water Supplies Analyzed.

Date of collection.	Name of owner.	Bacteria in 1 c. c.	
		Total.	B. Coli.
1910.			
Sept. 23	Well at Musser's,	10,000	70
23	Well at Musser's,	24,000	2,250
23	Creek supply at Musser's,	10,000	150
23	Creek supply at Musser's,	2,400	80
26	Creek supply at Musser's,	3,000	5
26	Well at Musser's,	350	0
26	Welll at Stouffer's,	20	0
28	Well at Wm. Brown's,	230	0
28	Well at Farmer's Creamery,	8,400	5

Treatment of Public Water Supply.

Assistant Engineer Irwin supervised the treatment of the water in the distributing reservoir, copper sulphate being used for the purpose. This was done on October 1st. On the same day apparatus was set up at the pumping station for the treatment of the water with copper sulphate. The treatment was begun October 2d. One part by weight, of chemical to a million parts of water was applied. In the following table are shown the results of analyses of the public water supply and of the raw water.

Analyses of Raw and Settled Chiquesalunga Creek Water.

Date of collection.	Locality.	Bacteria in 1 c. c.	
		Total.	B. Coli.
1910.			
Sept. 23	Head race,	80	5
28	Head race,	4,800	1,200
29	Head race,	1,200	0
29	Head race,	300	10
Oct. 13	Head race,	200	0
Nov. 14	Head race,	6,600	8
Sept. 28	Sedimentation basin,	200	4
29	Sedimentation basin,	2,700	5
29	Sedimentation basin,	450	0
Oct. 4	Sedimentation basin,	27,000	5
5	Sedimentation basin,	300	5
13	Sedimentation basin,	60	5
14	Sedimentation basin,	4,000	10

Reservoir Water Before and after Treatment.

	Before Treatment.		
Sept. 23	Inlet,	480	0
23	Outlet,	600	0
29	Inlet,	3,600	5
29	Outlet,	900	5
29	Outlet,	720	5
	After Treatment.		
Oct. 4	Inlet,	16,200	0
4	Inlet,	1,200	0
5	Inlet,	600	0
5	Outlet,	200	0
13	Inlet,	20	0
13	Inlet,	16	0
Nov. 14	Inlet,	1,000	5
14	Outlet,	180	0

Tap Water About Town Before and After Treatment.

Date of collection.	Locality.	Bacteria in 1 c. c.	
		Total.	B. Coli.
1910.	Before Treatment.		
Sept. 23	Hotel McGinnis,	820	0
23	Gainers Milk Depot,	13,500	50
23	H. H. Nissley,	12,000	2,850
26	Kaufman,	500	20
26	Gainer,	1,200	8
26	Hotel McGinnis,	2,000	20
28	Washington Hotel,	250	0
28	Jas. Webber,	280	0
28	C. H. Zeller,	400	0
28	Farmer's Creamery,	400	4
28	Bertz Hotel,	12,500	300
28	Hotel McGinnis,	130,000	50
29	Washington Hotel,	210	0
29	C. H. Zeller,	120	5
29	Gainer,	210	0
29	Hotel McGinnis,	100	5
	After Treatment.		
Oct. 4	Tap in town,	9,700	0
4	Tap in town,	500	0
4	Tap in town,	1,500	0
5	Tap in town,	600	0
5	Hotel McGinnis,	160	0
5	Hotel McGinnis,	200	0
13	Washington Hotel,	24	0
13	Hotel McGinnis,	30	0
Nov. 14	Hotel McGinnis,	7,000	0

The first table shows analyses of raw and settled water. It appears that the source of supply contains sewage pollution. This in itself was sufficient basis to notify the public to boil the water. Cattle stand in the stream and wade in the runs that course through the pasture fields above the watershed. On September 30, 1910, the Commissioner of Health sent the following communication to the Burgess and Town Council.

"There are thirty-two known cases of typhoid fever in your community and your public water supply is not above suspicion as being the medium of transmission of the disease. This comes from a watershed which is populated and liable to seriously poison the water at any time. It is not safe for your town to furnish this water unfiltered and unpurified to your consumers. You are hereby requested and ordered to prepare plans for the treatment of the water and submit them to the Department of Health for approval. We shall be very glad to advise and co-operate with you in the preparation of these plans and hold ourselves in readiness for conference. Meantime, you should treat your water with a germicide and an expert from this Department will call upon you to explain what should be done

A committee of the borough council conferred with the State Department of Health in Harrisburg on October 31st. The local authorities had two propositions under contemplation; one to filter the existing creek supply and the other to obtain water from a spring. Some of the citizens were in favor of the latter but the Committee of Council were the opinion that the yield of this spring in dry weather was too limited. The matter of building the water filter had been taken up with an engineering firm and with a filter company. The council wished to be advised whether the municipality should employ the services of a disinterested expert or deal directly with a company contracting to prepare the plans and install the plant. The committee returned to Mt. Joy with the intention of visiting filter installations in one or two places of the size of Mt. Joy and of preparing plans and submitting them to the State Department of Health for approval. At the end of the season the water was being treated with a germicide and the plans of a filter plant, had not been prepared by the borough so far as the Department was informed.

The danger from infection on the watershed lies mostly in the fact that physicians are known to be lax in reporting typhoid fever cases. A physician whose name is known to the Department attended two cases of typhoid fever in Rapho township on the watershed neither one of which was placarded or reported. One was that of Mrs. Anna Johnson 54 years of age, seven in family, first visit of doctor January 18. The patient declares that the case was treated as typhoid fever. The other case was that of Jeremiah Barto, the doctor being first called in December, 1909. When asked to give a written explanation the doctor defined his attitude that the cases were not reportable. He did not diagnose them as typhoid fever. In order to keep the patients quiet he told them they were typhoid fever-like. This excuse in reporting typhoid fever has been given in many rural districts in the State and it increases the danger of transmission of infection by water carriage and makes more imperative the construction of water filter plants where the source of supply is drawn from sparsely populated water-sheds from which the streams get their waters.

From the table of reservoir water before and after treatment it may be seen that in only one instance subsequent to the application of the chemical germicide to the water at the pumping station sewage pollution was found in the sample of water collected at the reservoir. Germicidal treatment as a carrier of infection is efficient, but not an absolute remedy. The methods of application are such that more or less infection at times and for short intervals may pass by into the distributing system. For emergencies the process is a great blessing, but for constant reliance filtration at Mt. Joy should be substituted.

From the table showing the quality of the water before and after treatment it will appear that after treatment the water was sterile. The pipes were flushed so the infected water was drained out as far as possible and the results of the Department's efforts are shown in the analyses.

Conclusions.

The epidemic was due to the contamination of the milk at the Musser farm and the spread of the infection along the milk route in the borough. Subsequent cases in the same families were due in some instances to secondary infection The avenues of transmission of typhoid fever are so numerous that onces the disease becomes started in a community it is not necessary to explain or even to attempt to explain how the fever actually was handed about from house to house or person to person. Undoubtedly the prompt action on the part of the State Department of Health in enforcing preventative measures kept the epidemic within bounds.

33. TYPHOID FEVER AT AVELLA VILLAGE.

On September 17, 1910, Dr. C. B. Wood, County Medical Inspector for Washington County, notified the Commissioner of Health that he had visited Avella village, Independence Township, on September 16th, and inquired into the cause of the six cases of typhoid fever then under the care of Dr. Harry Stunkard, Dr. Wood gave it as his opinion that the water supply was responsible. One well on the premises of J. B. Painter was particularly unsanitary being located in a filthy alley where slops of all kinds are thrown, and drain down into a pool in front of the well. There was nothing to prevent this liquid from following down the well tubing into the water below. The privy vault on the property was full and overflowing and the garbage box in a foul condition. Both of these are just across a narrow alley from the well. In his opinion, Painter should be compelled to close the well, clean the privy and discontinue the garbage box.

Dr. Wood reported that one case was in a family using the public water from spring at the reservoir on the hill above the village.

On September 24th, the local Health Officer, J. D. France reported six additional typhoid cases at Avella, making twelve cases in all at that time. The citizens had become alarmed over the situation. A number of privy vaults in the village were overflowing, many filthy spots existed and H. O. France was asked to clean up the place.

The Health Officer had advised Dr. Stunkard that a town meeting was the right way of stirring up sentiment in favor of prompt action to clean up the village.

"Sept. 27th, 1910.

"Dr. Samuel G. Dixon,
"Harrisburg, Pa.

"Dear Doctor:—About Sept. 9th, owing to the prevalence of typhoid fever in our midst we gave two samples of water, one from the city water and one from a suspected well, to Dr. Woods of Monongahela City, Washington County, inspector and at this date nothing has been heard from same.

"Owing to the laxness of the county health officers in enforcing strict sanitary conditions at my suggestion a meeting of the citizens was called in the town hall on September 26th, at which it was decided to clean up.

"A committee of three was appointed consisting of one physician, one school director and the township health officer to inspect the houses and try to have the same placed in a sanitary condition.

"Now we would like to know what power this committee would have and what procedure to follow to any persons who would refuse to put the premises in good sanitary condition.

First. Sewers, we have practically none.

Second. How best dispose of slops and excess water.

Third. Best method of disposing of waste and overflowing water closets.

Fourth. A copy, it you have it of the best methods of overcoming the common nuisance to distribue to sixty families.

"Any advice you can give us will be highly appreciated.

"Yours very truly,
(Signed) "Harry Stunkard."

When the sanitary field officers who were assigned to assist Officer France in bringing about improved sanitary conditions in the village, arrived at Avella, the place was pretty well cleaned up and in a fair sanitary condition.

General Conditions.

Avella is a coal mining village of about forty dwellings located on the south bank of Cross Creek in Independence Township, Washington County. The adjacent townships are those of Cross Creek, Hopewell and Jefferson. The outbreak of typhoid fever appeared about the first part of September. For the year, twelve cases only were reported for Independence Township. Undoubtedly more cases occurred, however, than were reported. The fever was local. From the following table it will be seen that in the four townships mentioned, there were ten cases only reported for September and eight for October and twenty-three for the year for all four townships, twelve of which were from Independence.

Township Typhoid Fever Reported 1910.

	Independence (Avella Village).	Cross Creek.	Hopewell.	Jefferson.	Total.
January,	0	0	0	0	0
February,	0	0	0	0	0
March,	0	0	0	0	0
April,	0	0	0	0	0
May,	0	0	0	0	0
June,	1	0	0	0	1
July,	1	0	1	0	2
August,	1	0	0	0	1
September,	7	0	3	0	10
October,	2	6	0	0	8
November,	0	0	0	0	0
December,	0	1	0	0	1
Total,	12	7	4	0	23

The Department did not make a canvass of the cases. All of the typhoid victims in Avella used either water from the Painter well or milk from Campbell's. The Painter well has an iron casing extending ten feet below the surface, is in a stable alley and only thirty feet distant from a vaulted privy. The earth about the well is nearly all made ground and overlies a limestone stratum nine feet below the surface. It is possible for sewage drainage from the privy and stable to reach the well.

The Campbell spring is on the hill and is situated at a lower elevation than a highway from which surface water can reach the spring. This spring supplies the milk house of Campbell who furnishes milk to nearly all of the villagers. Mr. Campbell was ordered to, and so far as the Department is aware, did boil the water for washing milk cans and pails during the outbreak. He was given instructions how to provide a proper concrete construction around the spring to protect the water, and the local health officer was to see that this was done.

Mr. Painter was directed to excavate his well to the limestone stratum and construct a concrete wall far enough above the surface to prevent drainage from reaching the limestone. The use of the well water meantime was prohibited. The results of the analyses of the water collected by the Department is given in the following table:

Water Anaylses.

Date of collection.	Locality.	Bacteria in C. C.	
		Total.	B. Coli.
1910. Oct. 5	Campbell spring, milk house,	3,500	150
7	Campbell spring,	23,760	10
7	Campbell spring,	14,560	10
7	Painter well,	21,600	42
7	Rohr's well,	2,000	6
7	Brenners spring,	18,000	35

Prior History of Painter Property Nuisance.

"Avella, Penna., Nov. 9, 1909.

"To the Superintendent of Bureau of Vital Statistics,
"Harrisburg, Pa.

"Honorable Sir:—The citizens of this town request me to report to you direct, the situation of the filthful condition of the private alley on the property owned and rented by J. B. Painter, R. D. No. 2 (Avella).

"Your local Registrar, J. D. France, of West Middletown, Pa., has been notified at different times, and he personally came and saw the condition, and understand from him that he notified Mr. Painter to have the condition changed, however the stench is simply awful, and if not looked after at once may be the cause of an epidemic, as there has already been, I am informed, four men sent to the hospital at Washington, Pa., who are afflicted with typhoid fever, who had been boarding with parties who are tenants.

"The premises are as follows: Horse barn in the basement, first floor as residence, boarding tenements; second floor has a pool room, sleeping and boarding and foreign hatchery; this place needs your attention at once, no use of depending on the home authority here to get anything done, as the party who owns the property is a great bluffer, the citizens of this place will await an early reply from your office at Harrisburg, as they have become tired of waiting for results at home. The public is in great danger of an epidemic unless the nuisance (if they should so call is) is not removed at once.

"Respectfully yours,
(Signed) "W. W. Weigmann,
"Justice of the Peace."

The matter was referred to the County Medical Inspector and Dr. Wood made an investigation and submitted the following report on November 17th:

"In accordance with instructions received from Commissioner Dr. Dixon, Nov. 11th, I visited Avella, Independence Township, and inspected the premises of J. B. Painter. The private alley in question is about one hundred feet in length and connects the public road with a street below. I found the conditions extremely unsanitary. Below is a sketch showing the location of the nuisance.

"The alley is very foul with manure and slops, and the entire place offensive. Health Officer France of West Middletown was with me and I gave him full instructions as to what should be done. Mr. Painter lives in the country and as he was away from home we could not get him to come into the village.

"The dwelling and boarding house, at times accommodate some forty foreigners. A case of typhoid fever recently developed in one of the houses, and this frightened most of the foreigners away. The fever case was sent to a hospital. The privy vaults are very offensive and the one marked with a cross should be cleaned out and then filled in and discontinued. The other one near the road should be cleaned out and well limed.

"The manure box is exceedingly nasty and should be cleaned out and strict orders given as to allowing the manure to accumulate. In fact manure cannot be kept there without the liquids, in wet weather, running out into the alley.

"I would suggest that a communication from you to Mr. J. B. Painter, R. D. No. 2, Avela, requiring him to comply with the instructions I gave Health Officer France, to enforce, would bring about the desired results.

Yours very truly,
(Signed) "C. B. WOOD."

Mr. Painter was communicated with from Harrisburg and nothing was heard subsequently from the health officer until the hot weather of the succeeding summer.

34. TYPHOID FEVER AT GLEN ROCK.

During September it came to the attention of the Department that typhoid fever had broken out in Glen Rock, York County. The cases had not been reported to the Department for fear it would prejudice the case of seven citizens who were defendants in a suit brought by the Commissioner of Health for the sewage pollution of the water supply of York city. At least one prominent citizen became thoroughly alarmed over the situation there and asked the Department to take a hand in suppressing the disease. On September 26th, the Chief Engineer was instructed to make the investigation of the water works and water supply and the sanitary conditions in the town, and to canvass the number of cases of typhoid fever known to the local Board of Health. For this purpose, Assistant Engineer Ralph E. Irwin was detailed to go to Glen Rock, examine the records of the local Board of Health, canvass the cases, note what local physicians had not reported their cases, as required by State law, and report. Assistant Engineer, M. E. Shaughnessy, and Inspector I. F. Zeigler, were to assist Mr. Irwin in this work. Assistant Engineer H. E. Moses was directed to investigate the water works system. Following is a report of the entire situation and what was done by the Department.

Water Supply and General Conditions.

The borough of Glen Rock is located in the south central part of York County, sixteen miles south of the city of York and four and a half miles from the Maryland-Pennsylvania line. It is on the main line of the Northern Central Railroad extending from Harrisburg to Baltimore.

The town has a present population estimated at twelve hundred and fifty. It was incorporated as a borough in eighteen hundred and fifty-nine and during the last decade has had a comparatively slow growth. In eighteen hundred and ninety it had a population of six hundred and eighty-seven, which had increased to eleven hundred and seventeen in nineteen hundred.

The continued growth of the borough seems to be assured.

Glen Rock is a thriving industrial town supported by a number of industries, chief among which are the following:

Neuhouse Manufacturing Company,	20 employees.
B. F. Sheaffer & Brother (Metal stamping),	25 employees.
S. E. Heathcote Company, Woolen Mills,	10 employees.
Dise Furniture Company,	16 employees.
American Wire Cloth Company,	25 employees.
Glen Manufacturing Company,	45 employees.
Enterprise Furniture Company,	50 employees.
J. M. Wanbaugh Bakery,	11 employees.
Morris Burnham & Co., Foundry and Machine Works,	65 employees.

The above industries give employment to practically all of the working population of the borough. Most of them, it is reported, operate the year round and give to the town an air of industrial activity.

Glen Rock is located in the valley of the south branch of the Codorus Creek, which rises in the hills at the Pennsylvania-Maryland State line near New Freedom borough, five miles southeast of Glen Rock. It flows thence in a northerly direction for a distance of fifteen miles, to its confluence with the west branch of Codorus Creek, uniting with this latter stream about two miles south of York. At this point on the south branch of the Codorus is located the pumping station of the York water works.

The valley of the creek at Glen Rock is narrow, with the ground rising rapidly to the hilltops. The railroad extends through the borough, paralleling the creek and in the vicinity of the railroad tracks, lies the most thickly built-up section of the borough, comprising the commercial centre. From this district the town extends on several streets which rise to the hilltops through depressions down through which flow, as a rule, small tributaries of the South Branch. All surface drainage reaches the creek either directly or by way of these tributaries.

In general the town presents a good appearance. The houses are usually of frame construction, of good design, with ample lawns surrounding them. There are in the neighborhood of two hundred and sixty buildings in the town, the majority of which are dwellings. Permanent sidewalks have been laid on most of the streets, all of which are unpaved.

Glen Rock has no public sewerage system. There are in the town, however, a number of sewers, both storm and sanitary, all draining directly into the creek. Some of these sewers are privately owned and others are owned and maintained by the borough.

The Department, in nineteen hundred and eight, in the course of an inspection of the Codorus Creek watershed, made a sanitary survey of the borough of Glen Rock. Many pollutions of the stream were discovered, two hundred and thirty-seven abatement notices being issued for six hundred and forty-one separate pollutions. The industries in the town were found to be in several instances polluting the stream and a suit was instituted against B. F. Sheaffer & Brother, manufacturers of stamped metal goods, to enforce the abatement of a pollution of the south branch of the Codorus Creek. This suit is awaiting final decision of the Courts.

Approximately forty per cent. of the people are supplied with water from private wells and springs, the balance using water furnished through the borough water works system. This system was installed in nineteen hundred and one and extends over practically the entire incorporated territory, comprising three hundred and fifty-four acres. The maximum consumption of water for all purposes is estimated to be one hundred thousand gallons per day, the average consumption amounting to eighty thousand gallons per day. Of this latter amount, sixty thousand gallons are used for domestic purposes, fifteen thousand for industrial and five thousand for public purposes. Based on actual consumers, the average per capita consumption of water daily amounts to one hundred and thirty-three gallons. As a rule the industries are supplied with water from private wells or springs. The maximum consumption occurs in the summer time as a result of street sprinkling.

There are one hundred and seventy-nine service taps in the borough. This distribution system comprises one and seventeen hundredths miles of four inch pipes, eight hundred and five thousandths miles of six inch pipes and three miles of eight inch pipes, this latter including the supply main leading from the reservoir into the town. The system was installed practically as it exists to-day in nineteen hundred and one, but in the fall of nineteen hundred and nine the four inch distributing main on Church Street was extended for a distance of about six hundred feet. Water is furnished throughout the borough for fire protection and a pressure of from eighty to one hundred pounds per square inch is obtained. The entire distributing system can be drained through a blowoff valve located on Water Street near the creek. Dead ends occur at several places, but in nearly every instance drainage of the pipe can be effected through a fire hydrant. It is reported that, at least during the summer months, the system is flushed weekly.

The source of supply consists of a number of springs and a small tributary of the south branch of Codorus Creek. The borough has constructed a storage reservoir in Shrewsbury Township about three miles northeast of Glen Rock. The high water level in the reservoir is two hundred and thirty-two feet above the surface of the ground at the corner of Hanover and Manchester Streets in the borough.

The reservoir is located in the middle of a field, is rectangular in shape, one hundred and seventy-five feet by one hundred and eighteen feet in plan, with an average depth of four and one-half feet. It is formed by earthen embankments, the side walls having a slope of one and one-half to one. The reservoir has an earth bottom and when built the entire area was stripped of organic matter. It was last cleaned in nineteen hundred and eight, so it is reported. It holds about six hundred and fifty thousand gallons and is fenced in.

The reservoir is fed by several springs in the bottom, by the flow from two springs which is piped into the reservoir, and by a part of the flow of a small tributary of the south branch of the Codorus, the balance of the flow in this stream being diverted around the reservoir into an ice pond below. The two springs outside of the reservoir lie in an open field about four hundred feet southeast of the reservoir. They are walled in, covered and thoroughly protected from surface drainage. The flow of water from this source is comparatively small. The amount of water issuing from the springs in the reservoir has not been ascertained, but these springs are said to be good producers.

The supply from the surface stream was originally intended to be used for emergency purposes only. However, during the drought of nineteen hundred and nine it was necessary to turn this supply into the system to be used for all purposes. The supply was again being used on the day of the Department's recent inspection, namely June twentieth. A small depression had been dug in the bed of the stream at the up-stream end of the reservoir, masonry wing walls thrown out and the water of the run carried into the reservoir through a six inch pipe. A gate is located at the intake end of this pipe. At the opposite end of the reservoir two overflow pipes discharge excess water into the creek below. At this end also a covered wooden intake box has been built in which double screens are placed. Through these screens the water flows into the eight inch supply main leading into the borough. The water is drawn off from the reservoir at a point near the bottom. An eight inch bow-off pipe, draining into the run below the reservoir, has been provided. The flow of water from this reservoir can be controlled through a shutoff valve located in the supply main about a mile below the reservoir. This is below the point at which a four inch main carrying the supply from the three Stermer Springs connects with the eight inch supply main.

The small stream which is used as a partial source of supply rises in Shrewsbury Township about a half mile southeast of the reservoir. It has a watershed of four hundred acres, practically all farm land under cultivation. There are nine persons living on the watershed. For the first two thousand feet above the reservoir the stream flows through meadow land, a portion of which is given over to pasturing cattle, the stock having access to the creek. There was evidence immediately above the reservoir that cattle had been in and near the stream recently. About two thousand feet up-stream from the reservoir, at a point where the road crosses the stream near the residence of John Smith, an open ditch leads from one corner of the barnyard and a pigpen to the stream. On the day of the Department's recent inspection drainage from this source was standing in the ditch at a point not over ten feet back from the main stream but was not actually running into the stream. A sample of the run water, taken June twentieth, nineteen hundred and ten, ten feet down stream from the outlet of said ditch, upon analysis, shows the following results: Bacteria in a cubic centimeter, fifteen hundred; bacilli coli in a cubic centimeter, five hundred.

The results of an analysis of a sample of water taken June twentieth, nineteen hundred and ten, from the intake box at the reservoir, are as follows: Bacteria in one cubic centimeter, twenty; bacilli coli, nine.

Analysis of two samples of water taken June twenty-seventh, nineteen hundred and ten, from taps in the borough, shows the following results: Abit's Hotel spigot—total bacteria in a cubic centimeter, thirty-eight; bacilli coli in a cubic centimeter, none; Dr. Seitz's office, total bacteria in one cubic centimeter, four hundred and eighty; bacilli coli per cubic centimeter, none.

The Department served two notices of abatement on said John Smith, one dated February eleventh, nineteen hundred and eight, and the other January second, nineteen hundred and nine; the former for the abatement of a stream pollution by drainage from pigpen, barnyard, kitchen wastes and wash water, and the latter notice for pollution by drainage from pigpen. Prior to the service of the last notice, a reinspection of this property was made by one of the Department's officers, disclosing the fact that all the pollutions had been abated with the exception of the drainage from the pigpen. That this pollution still exists was evident on an inspection made June twentieth, nineteen hundred and ten.

The principal source of supply of water comprises three springs located on the Stermer farm property in Shrewsbury Township about one thousand feet northeast of the reservoir. Two of these springs are located in a timber tract and the third in the middle of a cultivated field three hundred feet west. All of the springs are located near a small spring run rising in a spring near the Stermer house. This run is a feeder for the stream which supplies the reservoir, uniting with it below the reservoir.

The Stermer Springs have been all walled in, are covered and thoroughly protected from surface drainage, the walls being carried in each case at least a foot above the surface of the ground at the springs.

The water from the two upper springs is piped to the catch basin at the lower spring and from here flows through a four inch line to the eight inch supply main leading from the reservoir to the town. No facilities are provided for cutting off the flow from any of these springs. The intake end of the four inch line is equipped with a copper screen. On June twentieth, nineteen hundred and ten, a sample of water was taken from the catch basin at the lower spring, which upon being analyzed showed the following results: Bacteria in one centimeter, twelve; bacilli coli, none.

It is claimed that prior to the summer of nineteen hundred and nine, the flow of water from the Stermer Springs and from the springs in and near the reservoir was sufficient to meet the ordinary demands made on the water works system. At that time, owing to a shortage of water, it was found necessary to turn into the reservoir part of the water from the small stream.

In order to provide a similar occurrence the borough authorities prior to the drought of the current season entered into negotiations looking to the purchase of a well located at the Stermer farm house about nine hundred and thirty feet southeast of the upper Stermer springs. The well is nineteen feet deep by four feet in diamter. It is lined with masonry extending to solid rock. The water in the well stands fifteen feet below the surface of the ground. It is estimated that the flow in the well will equal eighteen hundred gallons per hour, or forty-three thousand two hundred gallons in twenty-four hours. An attempt was made recently to pump the well dry by means of the regular well pump, during which time the fluctuations in the water level amounted to not over eighteen inches. A subsequent test of the well was made with a steam pump for a three hour period, the pump operating at the rate of twelve hundred gallons per hour, or twenty-eight thousand gallons per twenty-four hours. The well showed little fluctuation in water level during pumping. It is said never to have failed even during the most severe droughts.

The well is located in the corner of the Stermer yard, directly along the York and Baltimore turnpike. All of the farm buildings are located on a lower elevation with drainage away from the well. Above the well the ground rises gently to the hilltops with but one house in the immediate neighborhood and this about one thousand feet distant. On June twentieth, nineteen hundred and ten, a sample of water was secured from the well and upon analysis showed the following results: Bacteria in one cubic centimeter, seventy; bacilli coli, none.

It is the intention of the borough authorities to pipe the water from the well down to the catch basin at the springs and to carry the side walls a sufficient height above ground level thoroughly to protect the well from any surface drainage. The top of the well is also to be properly covered. A pump will be left in the well for the use of the persons living at the farm house.

In addition to the supply from the well, the borough obtained water from several springs located on the Lentz farm, also in Shrewsbury Township, about two thousand feet northwest of the Stermer property. At this estate there are three springs located at the base of a hill distant from the farm house about five hundred feet, and a large spring situated near the barn. The cluster of three springs forms the head waters of a small spring run, known as Weinrich Run, which flows down past the farm house and the fourth spring referred to, joining the run rising on the Stermer property. At the present time the three springs are not used for any purpose, while the large spring near the barn forms the water supply at the farm house, the overflow passing through a spring house located near at hand. This spring has been walled in and protected from surface drainage. Samples of water were taken from three of the springs and upon being analyzed showed the following results:

	Total bacteria in 1 c. c.	B. Coli in 1 c. c.
Upper Lentz Spring No. 1,	8	0
Upper Lentz Spring No. 2,	68	0
Large Lentz Spring,	200	0
Weirich Run above Lentz barn,	210	0

The first sample was taken June twentieth, nineteen hundred and ten, and the others June twenty-seventh, nineteen hundred and ten.

The water from the springs is collected in a small catch basin below the large spring and is piped from thence to the four inch main leading from the Stermer springs. The surface drainage from the barnyard and out-buildings at the Lentz farm is away from that spring and into Weinrich Run just referred to.

None of the water from the Lentz springs will pass through the reservoir but will enter the supply main direct.

The small stream, water from which is turned into the reservoir, constitutes a dangerous source of supply and should not be used under any condition without first being purified. Even if the direct pollution of the stream from the estate on the watershed were abated, yet the land lying along the run serves as pasture land for cattle and the stream itself constitutes their supply of drinking water and is thus rendered unfit for domestic use. The borough officials should rely on the supply from the springs. From those now in service it is estimated that there is a nearly constant and uniform flow, amounting to about three hundred thousand gallons a day. This, in addition to the six hundred and fifty thousand gallons held in storage in the reservoir, should enable the authorities to meet the normal demands on the system. Furthermore, this is to be augmented by an additional supply from the Stermer well and the Lentz springs, if the said supplies are approved. Should these combined sources prove inadequate to supply the needs of the borough, there are other springs located along the pipe line, among which may be mentioned the Dise spring, having an estimated flow of one hundred thousand gallons daily, that can probably be secured and used to augment the supply for the town.

In view of these circumstances, the Commissioner of Health on July 12th, 1910, determined that the water supply under certain conditions, would not be prejudicial to public health, and he approved the same in a decree subject to the following conditions and stipulations:

"FIRST: The source of supply from the small surface stream which now affords a partial supply for the reservoir is condemned. While it is used temporarily the public should be forewarned that all water should be boiled to assure absolute safeguard against spread of infectious diseases of water-born character. As soon as the additional source of supply herein approved is obtained, then the borough shall cease to use the waters of the said small stream and such waters shall not again be used until a permit therefor shall have been issued by the Commissioner of Health. Before such permit will be issued plans for the adequate purification of such waters must be submitted by the borough to the Commissioner of Health and be approved.

"SECOND: As soon as practicable, the intake pipe from the surface stream at the reservoir shall be removed, the water at present in the reservoir shall be drained off, the reservoir thoroughly cleaned, and thereafter no water shall be allowed to enter the reservoir save from the source of supply herein approved.

"THIRD: The borough shall, before using the water from the Stermer well or the Lentz springs, properly protect these sources from surface pollution and plans thereof shall be filed in the office of the State Department of Health.

"FOURTH: The borough may from time to time make extensions to its pipe distribution system within the borough, and shall at the end of each season's work file plans of the extension made during the year, together with any other information which the Commissioner of Heatlh may deem necessary to fully understand the extent and use of the water works system.

"FIFTH: If at any time in the opinion of the Commissioner of Health the water works system, or any part thereof, shall have become prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve."

The Commissioner of Health advised the boiling of all the water, the discontinuance of the use of the surface waters and the employment of an engineer to advise relative to improvements to be made to the water works system and source of supply. The borough did not carry out these suggestions. They were thought unnecessary and further evident of the persecution of the town by the State Department of Health.

Legal Proceedings and History.

On May 15th, 1906, the Commissioner of Health sent the following notice to the Board of Health of Glen Rock, and received the reply which follows:

"May 16, 1906.

"Secretary Board of Health, Glen Rock, York County, Pa.

"Dear Sir: Complaints have been made to me to the effect that certain cesspools, drains, etc., in your borough, public or private, directly or indirectly discharge sewage into Codorus Creek from which the city of York takes its water supply, and with the desire to be just to all concerned, I ask you to inform me of the facts and trust if there is any reason for said complaint, that you will have the cause removed at once, and offering to help you, and hoping to hear from you, I am,

Yours truly,
(Signed) SAMUEL G. DIXON."

"Glen Rock, Pa., May 17th, 1906.

"Mr. Samuel G. Dixon, Harrisburg, Pa.

"Dear Sir: In reply to your letter of May 15th concerning cesspools and drains that pollute the Codorus Creek at Glen Rock would say that in 1898 the York Water Company brought suit against several individuals of our town for polluting the water. The courts of York county sustained our people on the ground that the stream flowing through our town are the natural drains and therefor a public and a natural sewer. The case was appealed to the Supreme Court which convened in Philadelphia with Judge Green on the bench in 1900 and sustained the decision of the lower courts.

"The same conditions exist now as did then and I cannot see why this matter should be agitated again and especially since York boasts of its pure water since the establishment of their filtering plant.

Very respectfully,
(Signed) W. T. SNYDER, Secretary."

The city of York, located on the Codorus Creek, and its suburbs, amounting in all to about 63,000 people, is supplied with water by the York Water Company. For fifty years the water company pumped water from the Codorus Creek and supplied it to the public. About three miles above the city, the main stream forks in two branches called the South and West Branches. In 1897 the company built a pumping station on the banks of the South Branch immediately above the confluence. In appropriating the waters of the South Branch for public usese, the water company did not exercise its right of eminent domain and hence its rights were not superior to those of other land owners along the stream. The water was first served to the city of York from the new pumping station late in December, 1897. The large sedimentation reservoirs were in an incompleted stag, so raw or partially subsided creek water was delivered directly to the consumers in the district. This delivery was followed almost immediately by a serious outbreak of typhoid fever in York, totaling 453 cases before the epidemic subsided. On investigation it was ascertained that there were 18 cases of typhoid fever in the borough of Glen Rock during the month of January. This place is 12 miles above the Water Company's intake and on the same stream. The dejecta were in a number of cases permitted to reach the stream and thus poison the supply of water to the public in York. To meet the situation and adequately to protect the public health, the York Water Company at once began the installation of a filter plant and it also instituted proceedings in the courts or co-operated with the State Board of Health to secure abatement of nuisance in Glen Rock.

George P. Yost was indicted for maintaining a nuisance by reason of the discharge of sewage from a privy into the South Branch of the Codorus Creek at Glen Rock from which at a point below numerous citizens of the Commonwealth obtained and were supplied with water for drinking and domestic purposes. The case was prosecuted by the Commonwealth. The second and third counts of the indictment were for refusing to obey an order of the State Board of Health to abate and remove a nuisance under the act of June 3rd, 1885.

Defendant was acquitted in the Court of Quarter Sessions, and decision reversed on appeal to Superior Court. Mr. Justice Brown, of the Supreme Court, on July 11, 1900, handed down an opinion. The main question appears to have been on the question of the maintenance of a public nuisance by Yost. Among other things his Honor declared as follows:

"If the public having a right to take from this stream pure and unpolluted water, found in it germs of disease, coming from a cesspool of the defendant, which he maintained on a tributary of the stream, his offence would be a public one, for which he would be properly indicted. The wrong would be against the whole community as a community—not simply against an individual or certain individuals, however numerous—and ought to be punished as a crime.

"If the public have a right to receive pure water through the agency of a corporation legally authorized to take it from a stream, he who pollutes it offends against the public.

"If on the other hand, the waters of a stream, in which riparian owners alone have an interest, be polluted, the wrong or injury is a private one, for which the individual or individuals injured may have redress; and this is true whether the riparian owner be a private person or a water company which does not take the water from the stream under the right of eminent domain. The rights of such owners are the same. * * *

"The defendant was in a criminal court and nothing was to be presumed against him. Before he could be convicted of any offense against the public, it was the duty of the Commonwealth to show that he had offended against the rights of the public. No such offense was proven; no right of the public to use the water pumped by the York Water Company was shown. If anything was proven on the trial, it was that a riparian owner, the York Water Company, had undertaken to divert and sell water, alleged to have been polluted by the defendant, from the South Branch of the Codorus Creek, which was not even shown to have been a public stream.

"In the absence of any proof that it had a right to do so, such right, in a prosecution of this kind, we repeat, cannot be presumed. The case, as presented to us for review, is one in which the waters of a stream may have been polluted by the defendant and were pumped out by a riparian owner for general use, but without any right on its part to so take and dispose of it. The wrong done by the defendant, if any, was to such riparian owner, the York Water Company, in depriving it of the use of pure water for ordinary domestic purposes any wrong committed was a private one, for which the remedy was purely civil. * * *

"Without formal action by the State Board of Health directing a nuisance of the cause of any special disease or mortality to be abated and removed, its secretary can neither speak or act for it in ordering the abatement and removal of the nuisance, and the disregard of an order so given is not indictable."

Under the law, Act 182 of 1905, all streams and springs and all bodies of surface and of ground water, whether natural or artificial, within the boundaries of the State are "waters of the State." Section 8 of said act reads as follows:

"All individuals, private corporations and companies that, at the time of the passage of this act, are discharging such sewerage into any of the waters of the State, may continue to discharge such sewage, unless, in the opinion of the Commissioner of Health, the discharge of such sewage may become injurious to the public Health. If at any time, the Commissioner of Health considers that the discharge of such sewage into any of the waters of the State may become injurious to the public health, he may order the discharge of such sewage discontinued."

Section 9 reads: "Every individual, private corporation or company, shall discontinue the discharge of sewage into any of the waters of the State, within ten days after having been so ordered by the Commissioner of Health."

The York Water Company represented to the State Department of Health that its source of supply to 57,000 people in its water district is subject to sewage pollution and asked the Commissioner of Health to abate the nuisances and remove the menaces on the watershed.

It is a fact that the waters of the South Branch of the Codorus Creek are subject to sewage pollution.

The South Branch and its tributaries above the pumping station of the York Water Company has a drainage area of about 110 square miles on which are resident in the neighborhood of 12,000 persons, averaging 109 inhabitants each square mile. Of this population about 4,000 are dwellers in nine boroughs, the largest of which is Glen Rock having a population of about 1,200. The other boroughs average about 350 inhabitants each. There are seven townships or parts of townships in the watershed containing largely farming lands and quite thickly populated for a country district. The South Branch rises in the hills near New Freedom borough which is located on the Baltimore Division of the Northern Central Railroad near the Maryland State line and thence flows northerly through Railroad borough, Glen Rock and Seven Valleys boroughs, a distance of about fifteen miles to the water works intake which is on the stream at a point immediately above the confluence of the south and west branches. The principal tributary of this stream is the east branch whose mouth is about two miles above the pumping station. Its watershed is wholly rural.

The said railroad follows down the valley of the South Branch crossing and recrossing the stream many times. It is the main line between Baltimore and Harrisburg. And this is one source of pollution or menace to the purity of the stream. Investigations by the Department have shown the existence of many overhanging privies and private sewers from which sewage is deposited directly into the water courses which yield the water used subsequently by the inhabitants of York and vicinity for drinking and general domestic purposes. The water company filters the Codorus Creek supply.

In 1908 the State Department of Health made a sanitary survey of the watershed above the intake. Two thousand nine hundred and twenty-six properties were inspected and all but 800 were found in a satisfactory condition. In cleaning up the pollutions, seven cases were referred to the Department's attorneys at York during the year.

As evidence of the general attitude of the people in Glen Rock and vicinity towards the State Department of Health, the following letter written to the Department on March 3, 1908, by the Department's local attorney at York is quoted:

"Mr. F. Herbert Snow, Chief Engineer,
Department of Health,
Harrisburg, Pa.

"Dear Sir: I have yours of the 28th, ult., apprising me of the fact that a corps of the Department Field Inspectors recently made a sanitary census of the Codorus Creek watershed with a view toward causing the abatement of various sources of stream pollution, and that in the course of duty Mr. William Wolf, of Glen Rock, had been notified to abate certain nuisances which were being inflicted on public streams in Shrewsberry Township on the property of said Wolf tenanted by Frank Kline, and that Mr. Kline had refused to accept service of notice and uttered some threatening remarks for the purpose of intimidating your health officer so that he does not dare make this service, and asking me for my opinion as to what would be the best course to pursue.

"As I understand it, the attempt was made to serve notice on Mr. Wolf, who is the owner of the real estate from which the nuisance emanates, which real estate is tenanted by Mr. Kline. I take is that your authority to abate this nuisance is given by the Act of General Assembly of Pennsylvania, approved the 22nd day of April, 1905, in Pamphlet Laws 260, Section 4, 7 and 10. I do not know your local health officer there, who was afraid to serve the notice on Mr. Kline, but my opinion is that he should summon up courage and make personal service on Wolf and also on Kline and report the same to the Health Department in the regular way. If you desire me to do so, I will notify Mr. Wolf and also Mr. Kline of the law which they are violating and which authorizes the service of notice of the abatement of the nuisance complained of. My opinion is that the notice, a copy of which you send me is not sufficiently definite. The words, "direct and indirect pollution of the natural water-course by drainage from pig-pen and barnyard, and by kitchen wastes and waste-water" are not sufficiently specific to indicate to the parties receiving the notice, just where the abatement must be made.

"Very respectfully yours,
(Signed) N. SARGENT ROSS,"

During the year 1909, the Department made a reinspection of the 800 unsatisfactory properties, and 797 steam pollutions were reported abated upon 471 properties, leaving at the close of the year 1909, 329 properties having nuisances still existing, 49 of which were referred to the Department's attorneys for prosecution.

In the borough of Glen Rock upwards of 200 abatement orders were issued. Among the number was an overhanging privy pollution of the stream at a factory where over 200 persons were employed.

The citizens formed some sort of a local association, established a fund for defense and assumed a defiant attitude against the Commissioner's orders. It was evident that litigation must ensue. The Department therefore chose to make the factory the test case and the following order was issued in July as follows:

"COMMONWEALTH OF PENNSYLVANIA,

"Department of Health,
"Harrisburg, Pa., July 23, 1909.

"To Benjamin F. Sheffer, Levi F. Sheffer,
"The Glen Rock Stamping Company, J. M. Grove, L. C. Grove, I. F. Grove, J. M. Grove:

"You and each of you are hereby notified that in the opinion of the Commissioner of Health of the Commonwealth of Pennsylvania the discharge of sewage and the draining from privies into the waters of the State, to wit; a branch of the Codorus Creek in the Borough of Glen Rock, York County, Pennsylvania, at or near a building on or near Baltimore Street in said borough, wholly or partly owned, controlled, occupied or used as a factory or place for work and manufacturing by Benjamin F. Sheffer and Levi F. Sheffer. The Glen Rock Stamping Company, J. M. Grove, L. C. Grove, I. E. Grove, J. M. Grove or some of them, and other maintained for the use of occupiers and persons working in and about said building and others, may become and has become and now is injurious to the public health, and that the said Commissioner of Health considers that the discharge of such sewage into the said waters of the State may become, has become and now is injurious to the public health.

"The said Commissioner of Health has duly caused examinations to be made of the said building and premises and finds and adjudges that the said privies at, in and near the same so maintained and used as aforesaid are a nuisance and nuisances detrimental to the public health, and you and each of you are hereby ordered to abate and remove the same and to discontinue the said discharge of said sewage and the drainage from said privies and not permit the same to flow into said waters within ten days from the service hereof; in accordance with the provisions of the Act of April 22, 1905, P. L. 260, and the Act, of April 27, 1905, P. L. 312.

"In witness whereof I have hereunto set my hand and the seal of the Department of Health this 23rd day of July, 1909.

(Seal) SAMUEL G. DIXON,
Commissioner of Health."

On October 20th, the grand jury found a true bill. The defendants took an appeal from the order of the Commissioner. The order of the Commissioner of Health was sustained and the appeal therefrom dismissed in an opinion handed down by Judge Wanner on January 12th, 1910. The opinion in full was as follows:

"This is an appeal from an order issued by Samuel G. Dixon, Commissioner of Health, requiring the appellants to discontinue the discharge of sewage into the South Branch of the Codorus Creek, from certain privies located on the premises owned and occupied by them respectively, in the borough of Glen Rock, York County, Pa. A certiorari was also sued out in this case, when this appeal was taken, but the objections filed thereon to the proceedings of the Commissioner of Health, were dismissed.

"It now remains to determine whether or not the appellants prior to the issuing of said order, had so polluted the waters of said stream, by the discharge of sewage into the same, as to make their condition detrimental to the public health or likely to become injurious thereto.

"The statutory authority of the Commissioner of Health to issue such an order, when conditions warrant it, is clear under the provisions of section 8 and 9 of the Act of April 22, 1905, P. L. 260, and of sections 8 and 9 of the Act of April 27th, 1905, P. L. 312.

"Section 8 of the former Act, permits parties who were discharging sewage into any of the waters of the State, at the time of the passage of said act, to continue to do so, 'unless in the opinion of the Commissioner of Health the discharge of said sewage may become injurious to the public health.'

"It further provides that 'If at any time the Commissioner of Health considers that the discharge of such sewage into any of the waters of the State, may become injurious to the public health, he may order the discharge of such sewage discontinued.'

"It is quite evident, therefore, that the Commissioner of Health is not obliged to wait until an outbreak of disease or contagion actually occurs, or until it has assumed the proportions of a public nuisance, before he may take official action to stay it. The Act of April 22nd, 1905, under which he proceeds, is entitled 'An Act to preserve the purity of the waters of the State, and for the protection of the public health,' and the Act of April 27th, 1905, P. L. 312, confers upon him all the powers for its enforcement, which were formally vested in the Board of Health of this Commonwealth.

"This legislation was held, in Commonwealth vs. Emmers, 221 Pa., 298, to be a valid and constitutional delegation of the general police power of the Commonwealth to the Commissioner of Health. It is, therefore, for him to determine when the pollution of the waters has reached a stage at which it may become injurious to the public health, so as to require the preventive action contemplated by the Act of Assembly. In the absence of a statutory right of appeal, his decision would be final, as the courts have repeatedly held, in construing the power of boards of health acting under the provisions of similar legislation.

"The authority of boards of health to stop the discharge of sewage into streams, at long distances from the point where their waters are taken for public domestic use, have been sustained in numerous cases. In Miles City vs. Board of Health of Montana, 102 Pac. 696, it was held that, as the statute was against the pollution of the waters of the State generally, it was immaterial on an appeal from an order of the Board of Health, that it was not proven that the polluting constituents of the water were carried to the very inlet of the city water supply.

"In Durham vs. Eno Cotton Mills, 5 S. E. 453, the order of the board of health was sustained, though the objectionable sewage was discharge into the stream, seventeen (17) miles above the intake of the city reservoir. To the same effect is State vs. Wheeler, 44 N. J. L. 88, which holds it to be immaterial, whether the sewage is shown to appreciably affect the water at the intake of the reservoir or not. The pollution of the water at the outfall of the sewer, it is said in one of the cases, is the forbidden thing.

"It was suggested at the argument, that the stream might purify itself, or the pollution therein become practically harmless before reaching the York Water Company's pumping station. But the testimony of the expert witness called in this case, was to the contrary, and indicated that the germs of typhoid fever especially, would, under ordinary circumstances, survive for a sufficent period, to reach said pumping station and communicate that disease to consumers of the water. Boiling the water was declared to be the only effective way of destroying these germs, and making it fit for domestic purposes. Its use, unboiled, for drinking purposes, or in the preparation of food, or for bathing, or in any way which would introduce it into the system, might communicate the disease. These direct dangers, and the secondary danger of the further spread of the disease in the community from an initial case, would make such a contamination of the waters at the appellants' premises, a menace to the public health at the borough of Glen Rock, as well as at the City of York.

"This case is not in our opinion ruled by Commonwealth vs. Yose, 197 Pa. 171, which was relied upon by the appellants' counsel. That was an indictment for maintaining a public nuisance and for failing to abate the same when ordered to do so, under the provisions of the Act of June 3rd, 1885, P. L. 56. Proof of the existence of a public nuisance being necessary to a conviction in that case, the prosecution failed, because there was no evidence offered of any public use of the polluter waters except as furnished by the York Water Company to the City of York, nor was there any evidence that said Company was a duly chartered corporation, having the right to take, and to supply said waters to the public. Upon that defective condition of the proofs, said company was held to be merely a private riparian owner whose injury from the pollution of the stream from which it took its supply of water, was only a private wrong, and did not constitute a public nuisance. But as we have already seen, this is a statutory civil proceeding for the prevention, or the stoppage, of such pollution of said waters, as may become injurious to the public health.

"It also appears in this case, that under the provisions of the charter of the York Water Company, viz: the Act of the 8th of February, 1816, 6 Sm. L. 319, and of the Act of the 11th day of April, 1840, P. L. 301, said company has the statutory right to take the waters of this stream, and furnish them to the public for domestic and other purposes.

"It was contended, however, that notwithstanding said nominal authority, the proofs must affirmatively show an actual taking of said waters by due legal process, under said Company's power of eminent domain, in order to make the pollution of the same a public wrong. But we do not regard the case of the Commonwealth vs. Yost as an authority for that conclusion, in this kind of a proceeding, and upon the facts of this case.

"The York Water Company is the owner and in peaceable possession of the bank of the stream upon which its pumping station stands. For fifteen years last past it has been engaged in furnishing said waters to the public as authorized to do by the several acts of Assembly above cited. It does not appear to have been necessary for it to enter upon the lands of any other person to take said waters, nor does it appear in doing so, to have so diminished the supply as to have injured any other riparian owner, or made necessary any legal proceedings to enforce its statutory rights. Under these circumstances, in a collateral inquiry like this, said Company must be presumed to be acting in the legal exercise of its corporate franchises. The maxim, amnia rite acta prasumuntur, would seem to apply to a situation like this. The pollution of the waters of this stream, which the York Water Company thus legally supplied to the City of York for domestic uses, would be a menace to the public health, and a sufficient ground to preventive action by the Commissioner of Health.

"The offense of unlawfully polluting the waters of a stream may be sufficiently made out, has been held, although there is no direct evidence at the trial, showing the use of said waters by lower riparian owners, for drinking and other domestic purposes: Commonwealth vs. Ashley Borough, 37 Pa., Super. Ct., Rep. 254.

"We have considered at length the legal questions raised at the argument by the appellants, as they constitute their chief defense. There was no material conflict of testimony as to the ownership and occupancy of the premises in question by them, or as to the actual discharge of sewage into this stream, from said premises. Neither was there any contradiction of the testimony of the expert witness called by the Commonwealth to testify as to the dangers to the public health, which might be expected to result from the pollution of said stream, in the manner disclosed by the evidence in this case.

Findings of Facts.

"(1) The South Branch of the Codorus Creek flows through the borough of Glen Rock, York county, Pa., about twelve miles above the point in said stream, at which the York Water Company, for fifteen years last past, has taken its water supply for the City of York. Its pumping station is located on its own land abutting on said stream.

"(2) Between the Borough of Glen Rock, and said pumping station, said stream, which is of considerable size, flows through thickly settled agricultural territory, and it waters are applied to the ordinary uses of the riparian owners.

"(3) From the date prior to the passage of the Act of April 22nd, 1905, P. L. 260, B. F. Sheffer and Levi Sheffer, two of the appellants, have been the owners of a certain lot of ground situate in said borough of Glen Rock, and having erected thereon a three-story manufacturing building.

"(4) The Glen Rock Stamping Company, one of the appellants, is a corporation, since the year 1902, has continuously occupied the first floor of said building, as a tenant of the above named owners thereof. J. M. Grove, Presiden; I. F. Grove, Treasurer, and L. C. Grove, Secretary of said Company, are also appellants in this case.

"(5) The second story of said building, since February 1st, 1900 has been continuously leased and occupied by the Industrial Sewing Company, a partnership, composed of the appellants, J. M. Grove and H. E. Hildebrand, who employ from one hundred and thirty to one hundred and fifty women in said building, in the regular course of their business.

"The third story of said building, is occupied by parties who are not appellants, or otherwise of record in this case.

"(6) There are separate privies, or water closets, providing for each of the floors of said buildings, which have been used by the above named companies and their respective employees, during the period of their several tenancies. From all of these privies sewage and human excrement, have, from time to time been discharged into the said stream, during the tenancy of the above named appellants, with their knowledge, and upon their management of the premises. Such sewage was being so discharged from said premises at the time of the issuing of said order to the appellants to discontinue the same.

"(7) The discharge of said sewage from said privies into said stream by the appellants, had previously polluted, and at the time of the issuing of said order of said Commissioner of Health was still polluting the waters of said stream to such an extent that it had become dangerous, and was likely to become injurious to the public health, at the Borough of Glen Rock, and at the City of York.

"(8) That the discharge of said sewage into said stream by the appellants, was likely to produce Typhoid Fever, Dysentery, Diarrhoea, and other disease amongst parties using said waters for drinking and other domestic purposes, and was also likely to spread typhoid fever amongst parties coming into contact with the contaminated waters, in the various ways specified by the expert witnesses in this case.

"(9) The York Water Company was duly incorporated under the provisions of the Act of February 8th, 1816, 6 Smith L. 319, and was also given authority to take water from convenient streams to supply to the citizens of York, Pa., by the Act of April 11th, 1840, P. L. 300.

"(10) The remainder of the water of said stream not taken by said York Water Company for the York City supply, after joining the waters of the other branch of the Codorus Creek, flows through the City of York several miles below said pumping station.

"(11) A careful and extended inspection of the buildings and premises occupied by the above named appellants and their tenants, and employees, and of the adjacent territory constituting the watershed of said stream, was made by duly authorized representatives of the Commissioner of Health, who reported to him the polluted condition of the waters of said stream, resulting from the discharge of sewage into the same by the appellants, substantially as hereinbefore set forth in these findings of fact.

"(12) In pursuance of said reports of his subordinates, and upon other information had, the Commissioner of Health, on the 23rd day of July 1909, issued an order directed to the appellants ordering them to discontinue the discharge of said sewage into said stream from the premises occupied by them in Glen Rock, Pa., within ten days after service of notice of the said order upon them.

"All of the appellants were duly served with notice of said order, whereupon this appeal was taken.

"Conclusions of Law.

"(1) The Commissioner of Health of this Commonwealth had due legal authority under the provisions of section 8 and 9, of the Act of April 22nd, 1905, P. L. 260, and sections 8 and 9, of the Act of April 27th, 1905, P. L. 312 to issue the order in question, requiring the appellants to discontinue the discharge of sewage into said South branch of the Codorus Creek at their premises in Glen Rock, Pa., if in his opinion such discharge was a public nuisance, or was likely to injure the public health.

"(2) The pollution of the waters of said stream by the discharge of sewage into the same by the defendants, as set forth in the within findings of fact, was sufficient legal warrant and authority for the issuing of the order in question for the discontinuing of the same, by the Commissioner of Health.

"(3) The York Water Company had a right under the provisions of the Acts of Assembly of February 8th, 1816, Sm. L. 319, and of April 11th, 1840, P. L. 301, to take its water supply from said stream for public use by the citizens of York, at and before the date of the issuing of said order by the Commissioner of Health, directing the appellants to discontinue the discharge of sewage into said stream from the premises occupied by them at Glen Rock, Pa.

"And now, to wit, January 12th, 1910: The order of the Commissioner of Health is sustained and the appeal therefrom, is dismissed at the cost of the appellants.

"By the Court,
"NEVIN M. WANNER, A. L. J."

Exceptions were taken to the order of the Commissioner of Health and on March 21st, 1910, Judge Wanner handed down an opinion dismissing the exceptions. His opinion in full was as follows:

"On the 23rd day of July, 1909, an order was issued by Samuel G. Dixon, Commissioner of Health of the Commonwealth, directed to the defendants in this case, ordering them, within ten days after service thereof upon them, to discontinue the discharge of sewage from certain privies located upon the premises occupied by them, in the Borough of Glen Rock, York County, Pa., into a branch of the Codorus Creek. Such orders also declared said privies to be nuisances, detrimental to the public health, and directed them to be abated and removed within the same period of time. Said order was issued under the provisions of the Acts of Assembly of April 22d, 1905, P. L. 260, and of April 27th, 1905, P. L. 312, and was duly served upon Benjamin F. Sheffer, August 6th, 1909; on L. C. Grove and I. F. Grove, trading and doing business as The Glen Rock Stamping Company August 5th, 1909; and on J. M. Grove, August 5th, 1909.

The defendants on the 19th day of October, 1909, took an appeal from said order to the Court of Common Pleas, and at the same time issued a certiorari to brings up the records of said Commissioner of Health in said case.

"On the 20th day of November, 1909, said Commissioner of Health, objecting that there was no legal warrant or authority for the issuing of said certiorari, for return thereto certified that on the 23rd day of July, 1909, by virtue of the authority in him vested, by the laws of this Commonwealth, he had issued to the defendants, the above mentioned order, of which a full copy was in said return set forth. To this a number of exceptions were filed by the defendants.

"We seriously doubt the regularity of this proceeding by certiorari and exceptions to said return. The Act of Assembly only provides for an appeal to the Common Pleas, for a hearing there on the merits of the case to determine whether or not the sewage, and the nuisances complained of were detrimental to the public health, as found by the Commissioner of Health.—Commonwealth vs. Emmers, 221 Pa. 305.

"No trial or hearing of the parties and their witnesses before him is authorized or contemplated by the Act of Assembly, nor is any final judgment pronounced, or fine imposed by him. His proceedings do not seem to be of a kind, which are reviewable on a certiorari. Neither is the certiorari a writ of right. It is not issuable except upon a special allocatur, unless there has been a final judgment against the defendant.—Wallace vs. Jameson, 179 Pa. 195.

"Conceding, however, that the issue of a certiorari may be proper practice to bring up the record, or the order of the Commissioner, for the inspection of the Court, in framing an issue on the appeal, we do not thing that these exceptions can be sustained.

"The defendants never had any legal right to discharge into this stream, the sewage complained of, to an extent that was detrimental to the public health.

"Section 8 of the Act of April 22nd, 1905, P. L. 260, only gave such parties as had been discharging sewage into streams previous to its passage, permission to continue to do so "unless in the opinion of the Commissioner of Health the discharge of said sewage, may become injurious to the public health." It also provided that "if at any time the Commissioner of Health considers that the discharge of said sewage into any of the waters of the State may become injurious to the public health, he may order the discharge of the same discontinued."

"Whether or not he shall issue such an order, is a matter within his official discretion to be determined either upon his own personal knowledge and investigation, or on the same, in connection with that of others, duly appointed to assist him.

"The first, second, and third exceptions are filed, on the ground that the Commissioner has not returned the original notice, or record of the proceedings had before him, but only the order of July 23rd, 1909, which was subsequently served on defendants.

"The order set forth in the Commissioner's return recits the fact that previous to its issue, an examination of the buildings and premises of the defendants had been made at his instance after which he had adjudged the privies on the defendants' premises, and the discharge of sewage therefrom into said creek to be a nuisance detrimental to the public health, for which reason it was ordered abated, etc. This was, in our opinion, a sufficient return, as it showed that all had been done which the statute required to justify the issuing of the order.

"Sections 8 and 9 of the Act of April 27th, 1905, give the Commissioner of Health personally full power to investigate nuisances detrimental to the public health and to abate them in the manner therein specified.

"The fifth exception is, that the Commissioner's return does not show whether the examination of the premises was made by the Commissioner of Health himself, or by a deputy or employee. We regard this as immaterial. It may be done in either way. The Commissioner is, by section 8 of the Act of April 27th, 1905, expressly authorized to appoint persons to make such examinations for, and with him, and the presumption of law is, that his official duties have been properly performed. If they were not, and defendants have knowledge that some one not authorized by law, made the investigation, and that it was unlawfully acted on by the Commissioner, that fact should have been alleged in the exception, and established by proper proofs afterward.

"The sixth and seventh exceptions, viz: That it does not appear whether or not the advisory board of the Department of Health had made proper rules and regulations relating to these matters, or whether such regulations, if made, were complied with by the Commissioner of Health, are dismissed. As we have already seen, the action taken by the Commissioner in this case, is duly authorized by the Act, without requiring the co-operation of the advisory board therein. The presumption at any rate would be, that the board and the commissioner were acting according to law in the absence of any allegation to the contrary.

"The conclusions we have reached as to these exceptions are based in the first instance on the terms of the Acts of Assembly cited above, and seen to be sustained by the observations of the court, in Commonwealth vs. Emmers, 221 Pa., 300. See also Commonwealth vs. Turner, 10 Lackawanna 79.

And now to wit, March 21st, 1910: The exceptions to the return of the Commissioner of Health in this case, are dismissed at the cost of the defendants.

"By the Court,

"NEVIN M. WANNER, A. L. J."

"Filed March 21, 1910, J. C. Ernst, Prothonotary."

An appeal from the judgment entered in the Court of Common Pleas of York County No. 3, January term 1910, sustaining the order of the Commissioner of Health and dismissing the appeal therefrom will be heard in the Superior Court during the year 1911.

Typhoid Fever Outbreak, 1910.

On September 24th, the Commissioner of Health called up the Burgess, Dr. W. C. Seitz of Glen Rock, and had a telephone conversation with him. It was rumored that typhoid fever was prevalent in the borough, but there were no official reports from the doctors to this effect. The Burgess admitted the facts and asked for advice. The Commissioner said that secondary infection should be prevented, the transmission of the disease through the medium of milk and fruits was quite probable, and that these vital things should be controlled and the printed instructions contained in the State Department of Health circulars should be carried out to the letter. It appeared that a number of the cases had been orally reported to the local Board of Health but the physicians wanted cards upon which to report and these were not furnished by the board, Such excuses were not satisfactory, the Board of Health must carry out the sanitary laws of the State or be removed from office. The cases were not being placarded and disinfection was not the rule. These things must be attended to by the local authorities. If the doctors refused to diagnose the cases as typhoid fever the local Board should act as a safeguard to the community. The people should be warned to boil the water. This was essential, not only for the protection of the citizens of the borough but for the traveling public. The Burgess said that if the State Department of Health could be of any further service, he would call upon the Commissioner. Not only did the Commissioner send his agents into the field but the following communications were sent out:

"Sept. 27, 1910.

"To the Burgess and Town Council,
"Glen Rock, York County, Pa.:

"Gentlemen:—Experience has proven that the Department's condemnation of that portion of your public water supply obtained from the run was justified. There are a large number of typhoid cases in your community and the public water supply is under suspicion. You must make a move immediately to render all of the water furnished by the municipal works to the public, pure and wholesome at all times. You should follow out the suggestions contained in the recent permit and employ a competent engineer to thoroughly study the situation and advise you properly, and the plans must be finally submitted to the State Department of Health for approval.

"A prompt reply stating what you intend to do is requested.

"Very truly yours,
(Signed) "SAMUEL G. DIXON."

"Sept. 26, 1910."

"Mr. Sprenkel,
Supt. York Water Company,
"York, Pa.

"Dear Sir:—You are probably aware, but I wish to emphasize the fact that there is an epidemic of typhoid fever in progress at Glen Rock. You should therefore, take extra precaution that this does not infect the water which you are supplying to the public in your district.

"Yours truly,
(Signed) "SAMUEL G. DIXON."

"Sept. 26, 1910."

"H. C. NILES, Esq., York Pa.

"Dear Sir:—The local authorities of Glen Rock borough have on their hands a typhoid epidemic numbering over 40 cases, so it is reported. These cases have not been reported according to law and the physicians are liable therefor. Furthermore, we suspect that the borough has been using its various sources of public water supply in direct defiance of the provisions of a permit granting an additional source of supply. The people there are altogether defiant and need to be severely punished but I trust that the punishment shall be legal rather than that visited by continued sickness and death. It is reported that they would not report the cases to us for fear it would prejudice their cases which you are trying for us and which will come up October 17th. I acquaint you with the situation and will lay before you more definite information in a day or so.

"Yours truly,
(Signed) "SAMUEL G. DIXON."

Dr. J. S. Miller, County Medical Inspector from York made some special investigations relative to particular cases of typhoid fever, as will hereinafter appear.

The following is what Assistant Engineer, R. E. Irwin reported relative to what he did in part:

"On the evening of September 26th, I went to York in company with Mr. Shaughnessy and on the morning of September 27th, Mr. Shaughnessy and myself took an early train from York to Glen Rock. During the forenoon we visited Mr. W. T. Snyder, Secretary, Board of Health, Dr. W. C. Seitz, Burgess, Victor Wanbaugh, Councilman, Dr. R. H. Hildebrand, Dr. J. F. Lutz and others. In the afternoon Mr. Ira F. Zeigler came to assist. During the afternoon properties on which typhoid fever cases were located were visited and the data designated on the census cards obtained. Throughout the remainder of the year the census work was continued whenever cases were reported by the local Board of Health or otherwise brough to notice.

"I found that the local Board of Health had very little supervision over health matters in the borough. The Secretary told me that there had not been a meeting of the local board of Health for several months. He said that he himself had been ill during the summer and had been away to a summer resort. When he returned in the early part of the fall he found that typhoid fever was prevalent in the borough and concluded that he did not wish to stay in the town and run the risk of contact with the disease so returned to the summer resort leaving no one to carry on the duties of his office. The physician of the Board, Dr. Seitz, who is also the Burgess, is opposed to the Department of Health's nuisance abatement work and he is a member of the association formed for the purpose. He did not wish it to be known that typhoid fever existed in the borough. He reported as typhoid fever those cases that had attracted public attention. He was treating a number of cases of bowel trouble but he maintained that they were not true cases of typhoid fever. The secretary of the local board said he received a copy of the model ordinance prepared by the Department of Health for local boards of health but the Board was still acting under borough ordinance, No. 29, which they considered sufficient. The following is a copy of Ordinance No. 29, said by the secretary to be the only one under which the local board has been acting:

Ordinance No. 29.

" 'Duties of attending Physicians in Contagious and Infectious Diseases.

" 'Section 1. Be it enacted and ordained by the Chief Burgess and Town Council of the borough of Glen Rock, Pa., and it is hereby enacted by authority of the same: That it shall be the duty of every physician attending cases of contagious and infectious diseases as classified by the State Board of Health, to report same immediately to the local Health Officer and secure from him a placard specifying the disease, which the attending physician shall conspiciously display on or near entrance to building in which the disease exists, for which service the attending physician so placarding shall receive no compensation. It shall be the duty of the attending physician to compel some member of the family or attending nurse to thoroughly fumigate all apartments occupied by patient during the disease, after the patient is fully convalescent, or in the event of death from some communicable disease, immediately after the removal of corpse.

" 'Section 2. Any physician or persons failing to comply with this ordinance on conviction of same shall be liable to a fine of $5.00 for each and every offence, said fine or penalty to be received by action of debt in the corporate name of the said borough before any Justice of the Peace in said Borough, said fine to be paid into the treasury of the borough for the use of said borough.

" 'Section 3. The disinfectant used is optional with party compelled to make disinfection as follows: For every 1,000 cubic feet of air space use 3 pounds of sulphur as follows: Take a tub, place in it three inches of water, in centre place two or three bricks, place on these an open iron vessel, in it place the sulphur, add some alcohol or kerosene so as to facilitate burning, light and close all crevices, close room for 24 hours. If formaldehyde, use 4 ounces to 1,000 cubic feet of air space, the generator for same can be had from the Health Officer who shall be custodian of the same. Formaldehyde is preferable in this—that it dose not discolor papering, etc. The material for disinfection must be secured by parties using same.

" 'Section 4. That all ordinances or parts of ordinances conflicting with the provisions of this ordinance are hereby repealed.

" 'Enacted and ordained this 6th day of April A. D. 1906.

" 'FLAVEL SEITZ.

" 'Attest:—H. A. KOLLER.' "

"The borough officials, other than Councilman Wanbaugh seemed to feel that the Department of Health was trying to persecute the borough. Many residents of the borough and adjoining townships formed an association to defeats the efforts of the Department in completing the abatement of stream pollutions in that district. However, during my work in the borough the officials were fairly courteous. I could usually get action through the various officials by insisting that the work be done and personally seeing that it was done.

"The records of the Bureau of Vital Statistics of the State Department of Health show the following typhoid fever report beginning with October 1905:

	1905	1906	1907	1908	1909	1910
January,			--------	0	0	1
February,		--------	0	0	0	0
March,		--------	0	0	0	0
April,		--------	--------	0	0	0
May,		0	--------	0	0	0
June,		--------	--------	0	1	--------
July,		--------	--------	1	3	0
August,		2	--------	0	1	3
September,		0	0	0	0	23
October,	0	--------	0	0	2	10
November,	0	1	0	0	2	6
December,	0	--------	0	0	1	0
Totals,	0	5	0	1	10	43

"It is believed that the above table does not show all of the cases of typhoid fever that have occurred within the borough. The incompleteness of the record is probably due to the inactivity of the local Board of Health and the antagonism towards the Department of some of the physicians and many of the residents of the borough.

"There were 55 cases of typhoid fever originating in Glen Rock during the year 1910. These cases occurred by month as follows:

April,	1
July,	2
August,	5
September,	32
October,	9
November,	6
Total,	55

"The onset of each of the 55 cases by day and month is shown in the following table:

Onset of Each Case by Day of Month.

Date.	July.	August.	September.	October.	November.
1,		1	1		2
2,		1			
3,			2	2	
4,					
5,			2		
6,					
7,					
8,					
9,			5		
10,			1		3
11,			3		
12,			3		
13,				1	
14,			3	1	
15,			4	1	
16,			1	1	
17,					
18,					
19,					
20,			2		
21,	1			2	1
22,			4		
23,	1				
24,			1		
25,					
26,					
27,		1			
28,					
29,					
30,		2		1	
31,					
	2	5	32	9	6

"April one case date not known.

"Total 55 cases.

"It will be noted in the above table that a large percentage of the cases occurred during the middle of September. It would then be expected that the infection causing these cases occurred during the latter part of August or the early part of September. The Department could not obtain a complete history of the cases occurring in July and August. The case of Priscilla Madeux was not diagnosed as a typical case of typhoid fever by Dr. J. F. Lutz and was not reported to this Department as a typhoid case. Dr. Lutz said, however, that it may have been typhoid fever and because of this it is included in the number of cases of 1910. The cases of Milton Zeigler, J. E. Kibler, Jessie Messersmith were reported as true typhoid. The case of Victor Krebs, having onset August second was attended by Dr. Hildebrand, was said to be a case of walking typhoid fever and was not reported to this Department. Mr. Krebs had previously been a driver of a bakery wagon owned by Victor Wanbaugh but when the case was suspicioned as being typhoid Mr. Krebs was no longer employed at the bakery.

"The case of Grace Barring, having onset August 27th, was investigated as thoroughly as possible. It was learned that Miss Barring came to Glen Rock on August 21st, and was visiting at the home of Howard Rohrbaugh who was the principal milk dealer in Glen Rock. Miss Barring was at the Rohrbaugh home from August 21st, to 27th, and during that time she assisted in the household work at Howard Rohrbaugh's. On August 27th, she was feeling sick and left Glen Rock for her home No. 26 Ocean Ave., New York City. On September 10th, a physician in New York City was called and diagnosed the case as typical typhoid. It was said by Mr. Rohrbaugh that Miss Barring had not assisted in the care of the milk at the milk house and the character of the cases occurring in the borough during September did not conform to an outbreak caused by milk borne infection as the cases as a whole, according to the local physicians, were mild in character and difficult to diagnose. There was no other information obtained showing that any of the early cases could have been the cause of the out-break during September.

"In the following table is shown the age and sex of the 55 cases and it will be noted that this table conforms very closely to that of the ordinary typhoid fever outbreak and does not have the appearance of an outbreak caused by milk borne infection but conforms more to that of the typical water born infection:

"Age and Sex.

Age.	M.	F.	
0-4,	2	2	
5-9,	2	5	
10-14,	1	3	
15-19,	4	4	
20-24,	7	4	
25-29,	2	1	
30-34,	1	3	
35-39,	2	1	
40-44,	3	1	
45-49,	1	1	
50-54,	1	1	
55-59,	1		
60-over,	1	1	
	28	27	Total, 55

"The occupation of the 55 cases are shown in the following table and it will be noted from the general tabulation that the occupation and onsets of the cases give no clue to the cause of the infection as concerns any individual case:

Occupation.

Housewives,	11
Pupils,	10
At home,	7
Wool mill,	2
Machinists,	2
Laborers,	3
Jeweler,	1
P. R. R. Station,	1
Driver, bakery wagon,	1
Printer,	1
Baker,	1
P. R. R. trackman,	1
School teacher,	1
Wood worker,	1
Physician,	1
Mechanic,	1
Sewing factory,	1
U. S. distillery gager,	1
Stamping mill,	1
Sash factory,	1
Employed in N. Y. City,	1
Tailoress,	1
Farmer,	1
Clerk,	1
Shirt factory,	1
Unknown,	1
Total,	55

"In the following table is indicated the water supply used by each of the 55 patients:

"Water Supply.

Public water supply only,	16
Well water supply only,	4
Spring water supply only,	
Public and Zeigler well,	1
Public and Messersmith well,	1
Public and Burnham well,	1
Public and Peterman well,	1
Public and Seitz well,	3
Public and Fisher well,	1
Public and Siltzer well,	1
Public and Moody well,	1
Public and Satdorus well,	3
Public and Reever well,	1
Public and Hayne well,	7
Public and Price well,	1
Public and Klinefelter well,	1
Public and Trout,	2
Public and Lau well,	1
Public and Markel well,	3
Public and Kibler well and spring,	1
Public and Seitz well and spring,	1
Public and Trout well and spring,	1
Public and Fair spring,	1
Total,	55

"From the above table is seen all but six of the 55 cases used the public water supply."

Treatment of the Public Water.

The following about the water supply is quoted from Mr. Irwin's report:

"The public water supply was composed of water from several springs, one well and one small surface stream. The reservoir located in Shrewsbury Township had several springs in the sides of the reservoir and others were piped to the reservoir. Still others were collected at a distance from the reservoir and entered the pipe line leading from the reservoir to the borough. The well which formed part of the supply was located near the springs feeding into the pipe line going from the reservoir to the borough and its water was delivered in the same manner. A permit had been given the borough of Glen Rock for the use of these supplies on July 12th 1910. The same permit disapproved of the use of the surface stream which entered the reservoir or could be diverted around it.

"On October 2nd, Mr. T. M. Brown, Chairman of Water Committee of Council told me that the surface stream entering the reservoir had been turned on over night for sometime and the order to do so was still with the man living on the farm directly below the reservoir and who does the work at the reservoir. Mr. Brown stated that the water would be turned into the reservoir about dark and turned off again as soon as the attendant began work in the morning. Mr. Brown stated the reason for using the water at night was that the land owners below the reservoir through whose property the stream passed had complained that the borough was taking water from their pasture land and threatened to bring suit against the borough.

"On October 2nd, I placed 5 pounds of copper sulphate in the reservoir in the usual manner, there being at this time about 500,000 gallons of water in storage. Also one pound of copper sulphate was hung from the inlet pipe so that the water entering the reservoir would pass over it and it would be slowly dissolved.

"The attendant at the reservoir told me on October 2nd that he had turned the surface stream into the reservoir from 8 to 9 hours each night and also each week the stream had been turned in continuously about one and a half days. He said that during the last three weeks the water had been used only at night.

"On October 3rd, I went to the reservoir in company with Mr. T. M. Brown and placed one pound of copper sulphate in the stream as it entered the reservoir. The stream had been diverted above the reservoir during the day and was turned on again at this time, it being 6: 30 P. M. The attendant at the reservoir was given one pound of copper sulphate and was instructed to put it in the stream entering the reservoir at 12 o'clock midnight. The following day the same treatment was given and the attendant was supplied with copper sulphate enough for several days to continue the treatment as described. This method of treating was continued as long as I was in Glen Rock.

"On October 5th, the following communication was sent to the Burgess and town council by the Commissioner of Health:

"October 5th, 1910.

"To the Burgess and Town Council of Glen Rock Borough,
"York County, Pa.

"Dear Sirs:—The Department will continue to disinfect and sterilize the water in the reservoir of your municipal water works system for three or four days longer, at the end of which time it shall withdraw from the town. You must continue to sterilize this water so long as you continue to use the surface supply, and it will not do to have this work in the charge of one unfamiliar with such things. You should engage the services of some competent individual acquainted with the nature of the chemical and the process of treating waters, and should place in his charge the responsible supervision. Meantime, you should follow out the suggestions already made to you of employing an expert to devise ways and means of obtaining an abundant supply of good and pure water. The managers of a private water company are criminally responsible for negligence resulting in sickness and death of water consumers, and no less responsible are municipal authorities having by law charge of a municipal water works system. In the emergency through which the borough is now passing, you should pay special heed to these responsibilities and be governed accordingly.

"Yours truly,
"SAMUEL G. DIXON."

"The following table shows the results of samples collected from the public water supply. In the study of this table it should be remembered that the water in the reservoir was treated with copper sulphate on October 2nd:

Results of Samples from Public Water Supply.

Date of collection.	Name.	Total bacteria per c. c.	B. Coli per c. c.
Sept. 26	Intake box at reservoir,	190	8
Sept. 26	Intake pipe from reservoir in run outside reservoir, raw water,	2,300	12
Sept. 26	Spring near road at reservoir,	48	0
Sept. 26	Upper spring in field at reservoir,	8	0
Sept. 26	Water Stermer's well at catch basin,	730	0
Sept. 26	Catch basin—upper Stermer spring,	380	0
Sept. 26	Middle spring—Stermer's,	1,800	0
Sept. 26	Lower Spring, Stermer's,	700	0
Sept. 26	Tap residence U. S. Bollinger, Glen Ave.—dead end,	1,200	0
Sept. 26	Tap Glen Rock Steam Bakery,	1,300	0
Sept. 26	Tap Floyd Heathcote residence,	2,200	0
Sept. 26	Tap residence E. S. Heitchue center of town,	54,000	5
Sept. 30	Tap George Shaffer's,	480	0
Oct. 3	Outlet at reservoir, treated water,	7,200	0
Oct. 3	Outlet at reservoir, treated water,	180	0
Oct. 3	Inlet at reservoir, raw water,	5,000	225
Oct. 3	Inlet at reservoir, raw water,	2,100	0
Oct. 4	Inlet at reservoir, raw water,	800	5
Oct. 4	Inlet at reservoir, raw water,	1,000	3
Oct. 4	Outlet at reservoir, treated water,	24	0
Oct. 4	Outlet at reservoir, treated water,	36	0

"The surface stream entering the reservoir originates about one-fourth of a mile above the reservoir on the property of John Smith. The springs at the origin of this stream were located in a swampy area but a short distance above the farm house and the stream passed some distance from the dwelling but within only three or four feet from what was called the wash house. At the time of inspection the washing was done on the bank of the stream and wash water was emptied into and upon the bank of the stream. Also drainage from the barnyard and pig-pen could enter the stream at the time of hard rains, causing surface drainage as was shown by small water courses formed during previous surface washing. An abatement order was served on Mr. Smith October 15th, 1910, but at the end of the year 1910 no abatement had been made.

"Dr. H. A. Hilderbrand informed Mr. Irwin that between August first and tenth Mr. Smith called at his office and upon examination Dr. Hildebrand found that Mr. Smith had symptoms of typhoid fever. Dr. Hildebrand gave Mr. Smith office treatment for typhoid fever. Dr. Hildebrand said he received no other information regarding the case and did not know whether Mr. Smith had ever developed a typical case. No information could be obtained from Mr. Smith or others showing that he had ever received other treatment than that given by Dr. Hildebrand.

Private Water Supplies

"In the following table are given the results of bacteriological analyses of individual water supplies. It will be noted from the study of this table in connection with that showing the public water supply used by the 55 cases of fever that no one individual supply was used by many of the patients. It is thought that the individual water supplies had little, if any, effect upon the number of cases:

Bacteriological Results—Individual Water Supplies.

Date of collection.	Name.	Total bacteria per c. c.	B. Coli per c. c.
Sept. 26	Wanbaugh spring, near Glen H.,	480	0
Sept. 30	H. E. Black well at barn,	24	0
Sept. 30	Walter Price well,	100	0
Sept. 30	Public school well,	100	0
Sept. 30	J. H. Kibler spring,	900	0
Sept. 30	Otto Sotdorus well,	500	0
Sept. 30	Wolf well,	450	1
Oct. 3	Wolf well,	7,000	0
Sept. 30	J. F. Lutz spring,	10	0
Sept. 30	James Koller well,	12	1
Sept. 30	Rider well on street,	700	0
Sept. 30	Noah Hildebrand, dug well,	110	0
Sept. 30	H. E. Black, well at house,	300	14
Oct. 3	Burnham well,	360	0
Oct. 3	J. D. Victor Wanbaugh well,	200	0
Sept. 30	Howard Rohrbaugh,	8,100	250
Sept. 30	Victor Krebs well,	80	0
Oct. 8	Howard Rohrbaugh well,	10	0
Oct. 8	Glen Manufacturing Company well,	40	0
Oct. 8	Elnor Brown well,	52	0
Oct. 8	Myers spring,	540	32

"That water samples collected from the two wells on the property of H. E. Black were collected because Mr. Black furnished a part of the milk supply sold by Howard Rohrbaugh. The week following the collection of these samples, the barn and dairy buildings on the Black property were burned and as the dairy was moved to another place no further samples were collected at this property.

"The Wolf well, which showed one B. Coli in the collection made September 30th, was improved by making a water tight cover over the dug well and the sample collected October 3rd, although showing a higher count, did not show any B. Coli.

"Howard Rohrbaugh, who furnished the principal part of the borough milk supply, obtained water for household use from a dug well which showed a large number of B. Coli in the samples collected September 30th. Mr. Rohrbaugh made a tight cover over the well and dug a ditch above it and graded the ground so that surface drainage could no longer get down the hillside from places above and reach the ground immediately surrounding the well. Also the well was cleaned. The sample collected from this supply on October 8th showed a low count and no B. Coli.

"The last sample designated as Myers spring was collected from the spring on the property of Mrs. Henry Myers in Shrewsbury township. It was at this place that many summer boarders were entertained. At the time the sample was collected, this spring was in poor condition for sampling as improvements were being made. A pipe line was being laid from the spring to the house and workmen had recently been engaged in digging a ditch from the house to the spring and laying the line. This may count for the disturbance in the spring water and the high count obtained. The well was some distance from the house, located on higher ground and there were no buildings or occupied estates above it. There was no history of typhoid fever having previously occurred on this property."

Milk Supplies.

"The milk supply for the 55 typhoid cases were found to be as follows:

Howard Rohrbaugh only,	35
James Koller,	1
Koller and Rohrbaugh,	18
Own cow,	1
Total,	55

"Howard Rohrbaugh furnished the whole or part of the supply for all but 2 of the 55 cases and had been delivering milk about the borough for ten years. He had been in the present location since about the first of April, 1910. He had no dairy of his own but secured milk from 4 dairyman in surrounding townships. The name, location and amount of milk usually secured from each of these dairymen were as follows:

H. C. Stine, Springfield Township,	10 to 12 gal.
W. B. Rohrbaugh, Springfield Township,	10 to 18 gal.
Noah Hildebrand, Springfield Township,	2 gallons.

"It was the custom for each of these dairymen to bring the milk to the borough each morning and evening. Most of the time the milk was taken not to the home of Howard Rohrbaugh but was delivered to him at some point on the route about the borough. When the milk was delivered at the milk house on the Rohrbaugh property it was usually left in the cans in which it was brought from the dairy and in this way the milk was usually kept separate until placed in the can in the wagon and peddled about the milk route. A very small portion of the milk was sold in bottles. Often the whole of the supply was sold directly from the wagon.

"Mr. Koller who had been in the milk business for about two years had no dairy of his own but obtained his milk supply from four dairymen as follows:

Oliver Krebs, Shrewsbury Township, 20 quarts.
Samuel Heindle, Shrewsbury Township, 25 quarts.
Frank Saunwald, Springfield Township, occasionally.
J. A. Diehl, Springfield Township, 25 quarts.

"Mr. Koller delivered but a small amount of milk in the evening. Sometimes the dairymen did not deliver until in the morning but when the milk was brought in the evening it was kept in the milk house on the Koller property until the following morning. It was the custom for the dairymen to meet Mr. Koller at some point in the borough as he was delivering milk. In the milk house each milk was kept separate but in the wagon it was sold from the common can.

"The eight dairies supplying the two milk men selling milk about the borough were inspected and all were found to be in a fair sanitary condition. They were not high class dairies but were conducted as the usual small dairy business is carried on with general farming. There was no typhoid history on any of the dairy farms."

Spread of Typhoid in the Township.

Glen Rock borough is surrounded by Shrewsbury Township. In that township for the year the following cases were reported to the State Department of Health:

Typhoid Fever in Shrewsbury Township 1910—Cases reported to the State Department of Health.

Name.	Onset.
1. Ellis Keeny,	Aug. 7
2. Mrs. Emma Smith,	Aug. 10
3. Mellie Weaver,	Sept. 9
4. Lydia Baily,	Sept. 17
5. Joshua Klinfelter,	Oct. 2
6. Mrs. John Stork,	Oct. 23
8. Mrs. John Sipe,	Dec. 5

The only cases in this table connected by the Department with the outbreak in Glen Rock borough, is that of Miss Weaver.

"Mellie Weaver, 15 years of age and a resident of Shrewsbury township near the Myers farm was taken sick with typhoid fever on September 10th. Miss Weaver before developing typhoid fever, had been employed at the Myers farm and had frequently gone to Glen Rock in company with the summer boarders. Miss Weaver had been employed in the Myers home from about the middle of February until September 10th, 1910.

"Mrs. Henry Myers and daughter of Shrewsbury township living about two and one-half miles from Glen Rock, during the last 15 or 20 years have been entertaining summer boarders from Baltimore. The number of boarders each year varied in number from 15 to 20. During the summer of 1910 a total of 32 boarders were entertained. Some of these were business men who came to stay with their families over Sunday. It is said by Mrs. Myers and daughter that many of these boarders visited Glen Rock and while in Glen Rock obtained water and ice cream. The ice cream obtained while in Glen Rock was that sold at the Glen Rock pharmacy. This ice cream was purchased not in Glen Rock but from an ice cream factory in York. Four of these boarders complained of headache and feeling sick while on the farm and then returned home. The names and length of stay on the Myers' farm of the boarders who returned to Baltimore because of sickness were as follows:

Bessie Leinbach, July 9th to Sept. 10th.
John Otto, July 8th, to August 31st.
May Bushman, August 17th to 30th.
Margaret Diggs, August 1st to 31st.

The State Department of Health furnished the Commissioner of Health of Baltimore with the names of the 32 summer boarders at the Myers home and dates when the boarders were entertained, and requested to be informed whether or not any of these summer boarders were reported to the Baltimore Department as having typhoid fever. On October 6th, the Assistant Commissioner of Health, Dr. Hampson Jones of Baltimore replied stating that the following typhoid cases were reported to the Department of Health of Baltimore from the 32 summer boarders at the Myers home:

Helen Grace Ortman, 407 Milton Ave. Reported sick September 27th.
John Otto, 1913 McElderry St. Reported sick September 10th.
Margaret Diggs, 1702 E. Preston St. Reported sick Sept. 14th.
Marie Beischman, 1930 Orleans St. Reported sick September 30th.
Bessie Leinbach, 220 S. Broad St. Reported sick Sept. 6th.

"It will be noted that four of the 5 cases reported by the Baltimore Board of Health were feeling sick when they left the Myers' farm. It will be noted that the date of feeling sick for all 5 cases correspond very closely to the period in September when most of the cases had their onset in Glen Rock. It is said by the Myers family that all of these cases developing typhoid fever had visited Glen Rock."

Conclusions.

"Miss Mamie Wylie, a resident of Baltimore, visited Robert Gladfelter of Glen Rock four days, beginning August 28th. It was reported in Glen Rock that Miss Wylie developed typhoid fever after returning to Baltimore. The Commissioner of Health of Baltimore informed the Pennsylvania Department that Miss Wylie was reported at Baltimore as a typhoid fever patient on September 22nd, having left Glen Rock to spend two weeks at Blue Ridge Summit, and returned to Baltimore Sept. 15th. It is very probable that this case should be attributed to Glen Rock as well as that at the Myers farm.

"From the foregoing facts related in reference to the 61 cases of typhoid fever attributed to Glen Rock borough it is believed that there was a general infection and that the infection came through the public water supply. The evidence against the public water supply is not as conclusive as is often the case. While it is possible that the milk supply delivered by Howard Rohrbaugh may have been infected while retained at the milk house on his property, still this is very improbable. The character of the cases do not suggest a milk borne infection, also there were several infected who came into the borough and did not have access to the borough milk supply. The one common and contributing factor seems to be the public water supply. It is not known that there was a true case of typhoid fever located on the watershed. It is possible, however, that there was a case of mild typhoid, it being the case of John Smith who came to the office of Dr. Hildebrand for consultation and who showed at that time the symptoms of typhoid fever.

"There were few sanitary precautions taken in the care of the typhoid fever patients in Glen Rock. In some cases the property on which the patients were located was connected directly with Codorus Creek by private sewer lines and little or no effort was made to disinfect the excreta. The presence of typhoid fever in this borough increased the danger of infection in the city of York through the public water supply of York, and the York Water Company was so informed."

On July 22 and in two successive issues, a notice to the effect that the water should be boiled appeared in a local newspaper, "The Item," published weekly. A copy of the notice follows:

Boil the Water.

"The borough council at a special meeting Friday evening, the health officer being in attendance, decided to notify all users of water of the borough system to boil all water used for drinking and cooking purposes. This precaution needs be taken only until the work now in progress to supply an additional source of water is completed, which will be a matter of only a few weeks.

"The cases were distributed throughout the borough and during the long period over which the cases extended the outbreak was exceedingly free from secondary cases. We have but one marked case of secondary infection, being in the Heyne family. On September 15th and 22nd two of the Heyne family were stricken with typhoid fever and were cared for by the members of the family in the home. The sanitary conditions were good and patients were well cared for, although practical methods of disinfection were not fully carried out."

The Department caused the arrest of Mr. Smith for stream pollution; he entered bail and the case came to trial early in January the next year. It would seem that in this case the spirit of opposition to the work of the State to bring about the preservation of the purity of the waters of the streams in York County had brought down upon the citizens of Glen Rock a visitation of typhoid fever due to sewage pollution of its own supply and due to insanitary practices for which they desired no correction.

35. TYPHOID FEVER IN BYRENSVILLE VILLAGE.

In September the Commissioner of Health directed the Chief Engineer to investigate a sudden outbreak of typhoid fever in the village of Byrensville, Conyngham Township, Columbia County, Pennsylvania. Inspectors Teats and Beckley were assigned to the field work. The disease was confined to a small neighborhood. The origin was not discovered. Well water may have been the cause. The peculiar thing about the situation was the epidemic occurrence of typhoid fever traced over a period of eight years.

General Conditions.

Byrensville is a small coal mining village located in the extreme southern portion of Columbia County in Conyngham Township, about half way between the boroughs of Centralia, said township, and Ashland borough, two miles distant in Butler Township, Schuylkill County. The said village consists of two sections known as the Upper and Lower Village.

It was in Lower Byrensville that the typhoid fever broke out. This place consists of 21 houses of the usual type of miners' homes. They are without modern conveniences and the surroundings were not sanitary. Byrensville is located on a steep mountain-side. Until the summer of 1910 the residents of the lower village were compelled to obtain their drinking water from wells. There were four in the village. They were liable to pollution from surface drainage. One of them was especially dangerous because of the fact that it is located at the end of a slight depression in the surface where a considerable amount of surface water, kitchen drainage and slops and stable drainage nearby would reach the well. There was an individual privy within 20 feet of this well. It was closed and put out of commission in September when the Department's officers visited the premises.

Until the summer of 1910 there were only three privies in the lower village. Excrement had been deposited among the heavy undergrowth of bushes on the hillside above.

Lower Byrensville has a typhoid history. For the last eight years there have been from one to seven cases in a majority of the houses. There are 21 dwellings in the lower village and in them during the last eight years, including the season of 1910, there have been 46 cases of typhoid fever and 7 deaths in 13 houses. Only eight of the homes in Lower Byrensville have escaped typhoid fever. These 46 cases were distributed as follows:

Year.	Cases	Families.
1903,	7	In one family.
1904,	8	Among three families.
1905,	8	Among four families
1906,	8	Among four families.
1907,	0	
1908,	1	
1909,	3	In two families.
1910,	11	In five famililies.

The Outbreak of 1910.

During the year 1910 no cases of typhoid fever were reported from Centralia borough and two cases only have occurred in the last five years. In Asland borough 6 cases only were reported for 1910 and 8 for the last five years. The 6 cases in Ashland for the present year all occurred in October undoubtedly had nothing to do with the outbreak in Byrensville.

In the following table is given the list of cases and their dates of onset in Byrensville. All but two of them occurred in the lower village. Six of the cases were in the family of James Flannery. Thomas Brennan and Mrs. Brennen, formerly Bridget Flannery, were members of this family. Two of them occurred in the home of John Flannery, Senior, and the others in three separate families:

Typhoid Fever Cases in Byrensville Village, 1910.

Date of onset.	Patient		Age.	Remarks.
			yrs.	
Aug. 13	Mary Flannery,	All in one house	12	Lower village.
Sept. 1	James Flannery,		35	Lower village.
Sept. 6	Mollie Flannery,		16	Lower village.
Sept. 8	Annie Flannery,		14	Lower village.
Sept. 8	Thomas Brennen,		22	Lower village.
Sept. 15	Mrs. Thomas Brennen, nee Flannery,		20	Lower village.
Sept. 8	John McDonald,		12	Upper village.
Sept. 15	John Flannery, Sr.,		48	Lower village.
Sept. 15	John Flannery, Jr.,		10	Lower village.
Sept. 27	John Hogan,		16	Upper village.
Sept. 28	James Brennen,		23	Lower village.

On August 13th, 1910, Miss Mary Flannery was taken ill. She had drank freely of well water on the James McDonald property, which well the Department condemned and had closed. Miss Flannery had not been away from home during the summer. There had been two cases in the fall of 1909 on the property adjoining the James McDonald property where was located the well so liable to infection in the past years.

James Flannery next contracted the fever. Five days later Molly was taken sick and two days later Thomas Brennan, who with his wife, Bridget, was living at the James Flannery home. Annie Flannery also contracted typhoid.

About this time John Flannery, Sr., and his son were stricken. All of these patients used the James McDonald well water freely. No milk had been consumed in the family for some time.

John McDonald lived in the upper village but he spent much of his time in the lower village and frequently drank from the James McDonald well. His chum, John Hogan, contracted the fever 19 days after James was stricken. John Hogan often visited James while he was sick and undoubtedly contracted the infection in this way.

The outbreak alarmed the citizens that the local health officer took the matter up with the Poor Authorities of the county and they had the inmates of the Flannery home removed to the district pest house, which was turned into a temporary hospital, where the patients received proper treatment. Two nurses. Miss Laura McHugh and Miss Lottie Kahler, took charge at the temporary hospital. Dr. Elmer H. Maurer of Asland was the physician in charge.

The officers of the Department ordered a thorough cleaning up, gave instructions to provide proper methods for the collection and disposal of excrement and directed that the only safe course would be to use the public water supply if fever were to be dispelled from this typhoid ridden community.

Samples of water were examined bacteriologically with the following results:

Date of collection.	Locality.	Total bacteria in 1 c. c.	B. Coli in 1 c. c.
Oct. 20	Tap at John Flannery's,	700	0
Oct. 20	Well at James McDonald's,	1,620	40
Oct. 20	Well at James McDonald's	2,400	16
Oct. 20	Well at Mrs. Patrick McDonald's,	78	0
Oct. 20	Tap at Peter McHale's,	160	0

The Brush Valley Water Company operates a water works system in the district for mining purposes and has pipes in the village. Since the fever broke out this summer in Lower Byrensville, quite a number of hydrants were erected in the yards and the people are now using the public supply.

Conclusions.

The contagious nature of typhoid fever is exemplified in this case. Had the community been a larger one, instead of 11 cases resulting from the original infection an extensive epidemic might have been recorded. Attention to the disposal of the wastes of the household is imperative. The introduction of a foreign and pure water supply to a mining hamlet and the closing up and compulsory abandonment of springs and wells form the most effective way of maintaining healthful conditions with respect to water borne diseases in communities of this class.

36. TYPHOID FEVER AT CORAOPOLIS, ALLEGHENY COUNTY.

There was a typhoid fever outbreak in Coraopolis borough, Allegheny County, the third week in September which extended into October and totalled about fifty cases. The epidemic was reported to Harrisburg from Allegheny County on October 4th and the Chief Engineer was directed to have an investigation made to ascertain the origin of the infection, two local springs being suspected. Field Officer H. B. Moore, with Inspectors Irwin and Marshall began a canvass of the situation on October 5th and they traced the source of the epidemic to the springs. The following is a report of the outbreak:

General Conditions.

The borough of Corapolis is a residential community of 5,252, situated on the south side of the Ohio River about thirteen miles below the junction of the Allegheny and Monongahela Rivers and about sixteen and one-half miles above the point where the Beaver River empties into the Ohio. It is bounded on the east by Robinson Township and on the south and west by Moon Township. The inhabitants engage in business in Pittsburgh or are supported by employment in the manufactories in or near the borough. As is true of many of the suburbs of Pittsburg, Coraopolis is growing rapidly, houses are in demand and real estate activity foretells a continued increase in population.

The principal industry of the town is the Consolidated Lamp and Glass Company, employing about four hundred hands. Immediately west in the township is the refinery of the Pittsburgh Oil Refining Company and immediately east of the borough is the repair shop of the Pittsburgh Coal Company, employing one hundred and eighty hands. Still farther east is the plant of the Lewis Foundry and Machine Company, employing about three hundred hands. It is thought by people acquainted with local conditions, that the construction of the new shops of the Jones-Laughlin Company within about six miles below Coraopolis on the river, will result in an inflow to the borough for a place of residence of the better paid employees of said company.

The principal growth is likely to take place in the hilly sections in the southern part of the town.

The thoroughfares paralleling the river are named in order, First, Second, Third Avenue, etc. State Avenue is beyond Fifth Avenue, and between it and the river the land is comparatively flat, having slopes towards the stream not exceeding three or four per cent. This portion is liable to inundation during extreme freshets of rare occurrence. South of State Avenue, the slopes are at once steeper, some of the streets at right angles having grades reaching fifteen per cent. In this portion there are several deep ravines running approximately at right angles to the river, which constitute natural channels for storm drainage. Some of these ravines have been filled in and are not now visible in the flat portion of the town, in fact the only exception being the run lying between Montour and Maple Streets in the eastern part of the borough, known as McCabe Run. Montour Creek, which forms the immediate boundry line between Coraopolis and Robinson Township, rises about twelve miles to the south and forms the boundary between Findley and North Fayette Townships, Moon and Robinson Townships. The creek empties into the river just above the down stream end of Neville Island, which island extends up the river about five miles and terminates near Davis Island where there is a dam across the river. Much of the flow is cut off from the "back river," so called, lying on the south side of the island because of the said Davis Island dam. There is a second dam across the main or north channel of the river a little over one mile above Coraopolis and dam Number Three extends across the entire river about one-quarter of a mile below Coraopolis. The back river has a very sluggish current at ordinary and low stages of the river. Just below Dam Number Three, on the opposite side of the Ohio river, is the intake crib of the Sewickley water works, from which water is taken to supply Sewickley borough and the borough of Osborne directly opposite Coraopolis.

It appears that the larger part of the properties on the hills south of State Avenue have private bored wells from which drinking water is obtained. In 1907 when an inspection was made in the borough by the State Department of Health, the three principal springs in use were McCabe's, located under the culvert at State Avenue; Ritter's spring, so called, on Fifth Avenue east of Wood Street; and Ritter's spring on Fifth Avenue east of Locust Street. The first was used but little if any. The land around it was occupied by houses; but the other two springs were in extensive use at that time. The one east of Wood Street was walled up with dry stone masonry, and imperfectly protected. The other was inclosed with cement masonry and well housed. The extensive use of ground water for drinking purposes taken from territory occupied by dwellings is a custom accompanied with insecurity at best, and liable to prove prejudicial to public health. Next to a wholesale abandonment of such drinking supplies, the speedy removal of sewage from the district and proper disposal thereof, are most important. On November 2nd, 1907, the Commissioner of Health issued a decree to Coraopolis borough relative to water works and sewerage and among other things he stipulated as follows:

"Owing to the use of private springs and wells in proximity to dwellings, it is desirable from a general health standpoint to remove household wastes from the premises as speedily as possible, and, therefore, the borough authorities shall, by ordinance or otherwise, compel occupied abutting estates to connect with and use the public sewerage system at as early a date as may be found practicable.

* * * * * * *

"The borough's attention is especially directed to the suspicious origin of drinking waters derived from springs and wells in the district. Tests of these waters should be occasionally made and the sources condemned if found polluted."

Coraopolis Borough takes its water supply from the Ohio River through two filter cribs sunk in the gravel in the southerly side of the main channel of the river. The works are owned and maintained by the municipality. The local health authorities state that the average number of cases of typhoid fever have been six or less per year for the last few years, except during the fall of 1905, when water was pumped from the "back river." By recourse to the State records it appears that for October and November of that year there were forty cases of typhoid. Probably these returns were not complete.

Typhoid Fever History.

As reported to the Bureau of Vital Statistics of the State Department of Health, typhoid cases have occurred as follows in Coraopolis during the last five years and the last three months of the year 1905:

Typhoid Fever in Coraopolis. Cases Reported to the State Department of Health.

1905,	41
1906,	0
1907,	0
1908,	5
1909,	0
1910,	56

It is known that not all of the cases were reported by physicians and hence the returns to Harrisburg would be inaccurate, but it is believed reports are thoroughly indicative of the extent of the disease in the community.

Officer Moore investigated thirty-seven cases of typhoid fever occurring according to his canvass, between September 13th and October 16th. Twenty-five of these cases had their onsets, the last two weeks in September. In five days sixteen of these cases occurred, namely from September 22nd to the 26th inclusive, and in the next five days eight additional cases, making twenty-four onsets for ten days.

Perhaps the best way to show the sudden onset and distribution of the cases is the following:

Complete List of Cases.

For the week ending	
September 24th,	11 cases
October 1st,	13 cases
October 8th,	13 cases
October 15th,	5 cases
	42 cases in 4 weeks

This corrected statement is largely based on the dates of onsets, obtained from Mr. Moore's canvass and in places the dates earlier than the reports of them filed at Harrisburg. Furthermore, some of the cases reported to Harrisburg, Mr. Moore did not investigate. Others he discovered and investigated that were not reported to Harrisburg. In the following table is given the correct cases by months for the year 1910 for the borough of Coraopolis and the surrounding townships of Robinson and Moon. From this it will be seen that the outbreak was confined to Coraopolis Borough.

Typhoid Fever Cases in Coraopolis and Surrounding Townships for 1910.

Month.	Coraopolis.	Townships.	
		Moon.	Robinson.
January,	0	0	3
February,	3	0	--------
March,	0	0	--------
April,	0	0	--------
May,	0	0	--------
June,	0	0	--------
July,	0	0	--------
August,	2	0	3
September,	23	1	0
October,	28	0	3
November,	3	0	1
December,	2	0	1
	61	1	11

A hasty examination of the records of the local Board of Health on the morning of October 5th showed that the typhoid fever was confined almost exclusively to the First Ward in the western end of the borough. This fact indicated that the cause of the outbreak might be of local origin.

An immediate canvass of the milk supply, ice supply and the stores of the neighborhood handling oysters was made. It was found that nine dealers supplied milk to eighteen families in which were typhoid fever patients, that no cases of fever existed in the family of any dealer or among employees.

The ice was manufactured from distilled water. Oyster dealers had sold no oysters to the persons afflicted.

At the conclusion of the day's canvass it developed that nearly all of the patients had been recent users of water from two springs located in the vicinity. The most remote case was not over one-quarter of a mile from these springs. It also developed that about two weeks before the typhoid fever outbreak, a carnival had been held in the neighborhood of these two springs known as the Bowman and Neeley Springs, and that nearly all persons attending the carnival had drunk water from the sources which are locally celebrated as excellent for drinking purposes.

The Bowman spring lies just south of Seventh Avenue at a point about 225 feet west of Locust Street, and about one and one-half blocks southwest of the McKinley public school. This spring, located in a vacant lot, unfenced, is contained in a twenty-four inch upright tile. It is uncovered. In an alley south of this spring at an elevation twenty feet higher than the spring are five properties which discharge kitchen wastes and wash water to the surface. Numerous channels leading from said houses form artificial water courses for polluting matter to find its way to the spring. Garbage and debris deposited within forty or fifty feet of spring would have their drainage to it with every rain.

The Neeley Spring, at the corner of Locust Street and Fifth Avenue, likewise rises in a vacant, unfenced lot, is contained in a 24-inch upright tile and housed by a rough wooden shed. The drainage from Locust Street in rainy weather would reach the spring. When heavy rains fall, the spring rises rapidly and the water presents a yellowish appearance for a day or two. The Neeley dwelling is 175 feet easterly. Kitchen waste and wash water from the property may reach the spring.

It was found from the canvass of the cases, that the typhoid patients had drunk the spring water almost exclusively and especially was this the case with the twelve school children, all in attendance at the McKinley school which lies about equally distant from the two springs The school had been opened two or three weeks before the onset of the fever and the pupils had used as play grounds the vacant lots around the springs. All had drunk the water. Persons living nearby used the spring water almost entirely for drinking purposes. Because of the limited territory in which the typhoid fever occunrred, the borough water was not regarded with suspicion.

On the evening of October 5th the Neeley spring was put out of commission by the local Board of Health on recommendation of the Department's officers.

On October 7th the local Board of Health put the Bowman spring out of commission.

Of the 37 cases investigated, 11 were laborers, 18 school children, 3 were domestics, 2 housewives and 3 had no occupation. Eighteen of the cases were patients 16 years of age or more, and 19 were less than 16 years of age.

Twenty-six of the houses in which typhoid fever occurred were connected to the sewer system.

Water Analyses.

In the following tables are given the results of analyses of private spring waters and the borough waters:

Analyses of Spring Water, Coraopolis.

Date of collection.	Locality.	Bacteria in 1 c. c.	
		Total.	B. Coli.
1910			
Oct. 5	Curry Spring,	3,000	30
Oct. 5	Bowman Spring,	1,500	500
Oct. 5	Ritter Spring,	120	6
Oct. 11	Dunlap Spring,	700	0
Oct. 11	Dunlap Spring,	720	0
Oct. 13	Neeley Spring,	13,500	20
Oct. 13	McCabe Spring,	40,000	16
Oct. 13	McCabe Spring,	30,000	20
Oct. 13	Rider Spring,	27,000	40

Analyses of Borough Water.

Date of collection.	Locality.	Bacteria in 1 c. c.	
		Total.	B. Coli.
1910			
Oct. 5	Lutheran Church, 5th avenue,	420	12
Oct. 5	Geo. Meeley, 5th avenue,	140	8
Oct. 5	Tap,	450	0
Oct. 11	A. S. Welsh, 404 Mill street,	280	0
Oct. 11	Hotel Helm,	20	0
Oct. 11	G. E. Gillis, 4th avenue,	250	0
Oct. 11	Mr. Alexander, Mulberry street and 4th avenue,	12	0
Oct. 13	439 State avenue,	15,000	33
Oct. 13	P. & L. E. Station,	32,000	26

Both showed that the warnings and injunctions to the borough by the Commissioner of Health relative to the spring supplies in Coraopolis, and the public supply, were well founded. The citizens and the authorities of the town and not inclined to accept unqualifiedly the statements and admonitions of the State Department of Health. The springs are dangerous and the authorities have been told that they should close them up, yet to do this brings forth protest from the citizens of the neighborhood.

The public supply, will be more or less dangerous. A filter plant is needed and the water should be treated with a germicide constantly. There is no assurance that the filter cribs may not get out of operation, or that their efficiency may drop off at any moment. Funds with which to pay for extensions and improvements to the water works system must be authorized by the voters. It may take a terrific epidemic of typhoid fever and the sacrifice of many lives before public sentiment in Coraopolis will be aroused sufficiently to provide a proper safeguard.

37. TYPHOID FEVER AT WOODLAND VILLAGE.

On August 17, 1910, Dr. G. B. Shivery, of Woodland, asked for an analysis of a sample of water suspected of typhoid infection. He was informed by the State Department of Health that at that time the laboratory was overcrowded with work, but if it was imperative that an examination be made, the Department would send a sampling outfit for collection. Dr. Shivery was advised, however to examine the suspected sources to determine if the pollution thereof could not be stopped. If surface drainage had entered the water supply, the spring or well should be disinfected with lime.

On September 13th the Department's local health officer visited Woodland and placarded eight cases of typhoid fever. He reported that the village was without a good water supply and that generally it was in a filthy condition. The citizens were entirely dependent upon the Harbison Brick Company that owns the works which give employment to the inhabitants. The mining for clay had largely destroyed the water supply of the village. Out-buildings were located on the side hill above the dwellings and the wells. If nothing else can be done the town should be thoroughly cleaned up before cold weather, in his opinion, and he suggested that an officer be specially detailed to inspect the village. The local health officer was informed that at the present time all of the Department's special men were engaged in suppressing typhoid fever outbreaks throughout the State and that therefore, he would have to give his personal attention to the conditions at Woodland.

On September 26th, Mr. W. A. Hagerty, the local Health Officer, wrote as follows:

"The recent rain of Saturday and Sunday evening has washed out the small stream that runs through the village which would help to some extent. They have no water except what is in a few wells and in many instances the outbuildings are higher than the wells and can not help but contaminate them. The water for washing purposes has to be taken from the run into which many of the outbuildings drain. The back lots and cellars are not in good condition. Just now while the people are aroused about the conditions it might be well to serve a notice by mail or otherwise on each property owner wherever found to be in bad condition to remove all filth from their cellars and lots and whitewash the same or it would be done by the State Board of Health at their expense. It would greatly improve general conditions and possibly prevent an outbreak of scarlet fever or diphtheria this winter. I did this three years ago the result was I had all the lots, cellars and wells cleaned up and placed in good condition so far as it was possible to do. Please give me your opinion on the subject."

On September 27th, he wrote as follows:

"I was in Woodland this morning trying to find out the cause of the typhoid fever. I find that the house in which the death occurred has had seven cases of fever in it at different times, three within the last few weeks. The pump is located on the back porch and just above it on the side hill is the outhouse and above that an old clay mine that is full of stagnant water a portion of which at least must necessarily find its way into the well. The owner of the property has at different times been dumping lime into the well that may for a certain time and to a certain extent help matters but the fever is constantly breaking out at this particular property. As to the other cases I found that they were getting the water from a spring that comes out on the bank of the run that runs through the town. This water may not be very good for the reason that the entire country is honeycombed with mines from which the Harbison-Walker Company has been taking out clay. The other matter to consider is the milk supply. The entire town is furnished with milk from one man who lives on top of the hill. He has a spring on his premises that may be contaminated from the mines and at the same time it may be perfectly pure. The only other question that was put up to me was how well the bottles in which he served the milk to his customers were sterilized. The bottles from the houses in which the typhoid fever exists may not have been taken care of and he may have neglected to properly sterilize them. I believe it would be a good thing to have the water from the three points above named examined. I received notice to-night of three more cases."

Mr. Hagerty was instructed to issue verbal orders of abatement in each and every case demanding it. All wells used for domestic purposes should be protected from storm water and drainage from out-buildings. Sewering into the run must be stopped. A full report with respect to details was requested.

On October 4th, Mr. Hagerty reported a total of twenty-five cases in Woodland. He had examined the milk supply and gave a detailed account thereof. The ladies of the village were having a paper signed to send to the Commissioner of Health. Mr. Hagerty suggested to them that it would be well to organize into a sanitary society, appoint a committee and to go to work and have the village thoroughly cleaned. He promised to co-operate with them in order to get the settlement placed in as good a condition as possible.

On October 5th, the Commissioner of Health directed Dr. C. J. Hunt, Associate Chief Medical Inspector, to go to Woodland to suppress the typhoid outbreak there and on the 7th he sent Miss Katherine Gillespie to Woodland as district nurse. From the Engineering Division, Inspectors Ritter, Maclay and Magee were detailed to assist in cleaning up the village. The following is a report of what these sanitary officers did in detail.

Briefly, they made a canvass of all of the cases, noted conditions with respect to disposal of household wastes and the water supply, collected samples of water, directed the work of sanitation outside of the dwellings and issued formal orders of abatement of nuisances and menaces where verbal orders of abatement were not obeyed.

General Conditions.

The village of Woodland is located in the south central part of Bradford Township in Clearfield County, about six miles east of Clearfield Borough and three miles west of Wallaceton Borough. Connecting these two municipalities and passing through Woodland are the railroads of the Cambria and Clearfield Company and the New York Central and Hudson River Company.

Bradford Township is bounded on the north by the Clearfield River and the townships of Girard and Goshen; on the east by the township of Graham; on the south by Boggs township; and on the west by Lawrence township. Wallaceton Borough has 300 population and the Clearfield Borough 6,800 population. To the east of Wallaceton Borough is Morris Township, through which the New York Central and Hudson River Railroad passes.

These places are mentioned to facilitate the discussion of the existence of typhoid fever surrounding Woodland during the year 1910.

Woodland village has 204 occupied estates and a total population of 788 inhabitants. It is dependent mainly upon the Harbison-Walker Refactories Company, manufacturers of fire brick. This company operates two brick plants in the village and gives employment to 300 men and boys. East of Woodland, two miles distant on the railroads mentioned, is a station and small village known as Bigler, where five cases of typhoid fever developed during the epidemic at Woodland.

The inhabitants of Woodland obtained their drinking water from individual wells and springs. There is no public water works system. The village is drained by Roaring Run and Jake Run which flows into Roaring Run in Woodland. Roaring Run flows westerly and empties into Clearfield Creek, which is a tributary of the west branch of the Susquehanna River. The topography of the village is very rugged. Sandstone abounds on the surface of the ground and at a depth of ten feet a shale rock stratum is encountered, below which are the fire clay deposits. There is only one cesspool in the village; outside privies are mostly used. There are a few private sewers hereinafter mentioned.

The principal thoroughfare is called Main Street. It skirts along the base of a steep hill. Along this highway on the north side the houses abut against the foot of the slope. The privy vaults here are of loose masonry construction. Some privies have no vaults. All are located above the houses and wells from thirty to seventy-five feet distant therefrom. The sandstone and shale formation being quite porous, permits free percolation and is favorable to ground water contamination. The physical conditions at once direct suspicion to the purity of the well waters owing to the privy vaults nearby and on the hillside above.

There are several private drains taking kitchen drainage and wash water to Roaring Run but on two estates only where there is a drain, did typhoid fever occur, namely, at the homes of Dr. Shivery and Mr. Haines. The Shivery sewer carries sewage from the privy into Roaring Run at a point about 1,200 feet above a spring named Cold Spring, which is suspected of being the medium of transmission of some of the infection. Dr. Shivery's two sons, Kenneth and Burten, came down with typhoid fever on August 16 and 26th respectively. The excreta from these patients were deposited in the privy vault and were thence washed to Roaring Run.

The Hains home in which the first case of typhoid fever developed, July 20th, is centrally located on the north side of Main Street. The drainage from this house is conducted by an eight inch pipe under the highway to an open ditch and thence by this open ditch about four feet to Roaring Run, emptying into this stream 1,300 feet above the said Cold Spring. Into this drain, wash water and slops and kitchen drainage are thrown. Typhoid fever has a history in this dwelling. In 1895, there were five cases there; in 1908, one case, and during the summer of 1910, there have been four cases, as follows:

July 20th, Gladys Hains.
August 27th, Theodore Hains.
September 19th, Velina Hains.
September 22nd, Sam. Eckley.

A dug well on this property, eighteen feet deep, is located between the house and the summer kitchen and fifty feet only for a surface or loose masonry privy, which is elevated fifteen feet higher than the top of the hill. Two samples of water were collected from this well. They both show the presence of sewage organisms.

Hains Well Water Analyses, 1910.

Date of Collection.	Bacteria in 1 c. c.	
	Total.	B. Coli.
October 3,	200	4
October 10,	160	18

The Water Supply.

The town pump, so-called, is located at the confectionery store and restaurant of Andy Powell. The well is twenty-one feet deep, and ten feet from the roadside. The Powell privy vault is on the steep hillside fifty feet distant; the Hain's privy vault is 125 feet distant. This town water was analyzed by the Department and found to be polluted. It was disinfected and then the samples showed the absence of sewage organisms. In the following table are given the results of analyses:

Analyses of Water of Town Pump at Andy Powell's Store.

Date of collection.	Remarks.	Bacteria in c. c.	
		Total.	B. Coli.
Oct. 3	Before disinfection,	900	50
Oct. 10	After disinfection,	34	0
Nov. 15	After disinfection,	8	0
Dec. 5	After disinfection,	8	0

The "Cold Spring" is located on the bank of Roaring Run and a quarter of a mile below the Hains and Shivery sewers, points of discharge into the run. The spring is unprotected and nearly on a level with the surface water in Roaring Run at low water mark. Every time the creek rises the spring is overflowed and the sewage from the two house mentioned could contaminate the spring in this way. The waters from it are used extensively by the employees of the brick company. The Department analyzed samples collected from this spring and found them to be highly polluted with sewage. In the following table the results of these analyses are given:

Cold Spring Water Analyses.

Date of collection.	Remarks.	Bacteria in c. c.	
		Total.	B. Coli.
Oct. 3	Heavy rains, the week before,	2,300	120
Ost. 6	Condemned and closed,	----------	----------
Oct. 10	Not in use,	3	0

In the following table are given the results of analyses of various private supplies about the villages of Woodland and Bigler:

Analyses of Private Water Supplies, 1910.

Date of collection.	Location.	Remarks.	Bacteria in c. c.	
			Total	B. Coli.
Oct. 3	Barger well,	Typhoid on property,	36	0
Oct. 17	Barger well,	Typhoid on property,	24	0
Oct. 3	Company House B 10,		400	0
Oct. 10	Company House B 10,		24	0
Oct. 3	Beard well,	Before disinfection,	5,500	280
Oct. 10	Beard well,	After disinfection,	32	0
Nov. 15	Beard well,	After disinfection,	60	2
Dec. 5	Beard well,	After disinfection,	60	0
Oct. 10	Learish well,	Typhoid on property,	280	0
Oct. 10	Wisor spring,	Typhoid on property,	6	0
Oct. 10	Graffrus well,	Typhoid on property,	170	3
Nov. 15	Graffrus well,	After disinfection,	2	0
Oct. 10	Tap, lower brick works,		52	0
Dec. 5	Tap, lower brick works,		6	0
Oct. 10	Luzier well,	Typhoid on property,	6	0
Oct. 10	Heise spring,	Typhoid on property,	2	0
Oct. 19	Heise spring,	Typhoid on property,	110	0
Oct. 10	Heise well,	Typhoid on property,	30	0
Oct. 10	Dr. Shivery well,	Typhoid on property,	32	0
Oct. 10	Swift well,	Typhoid on property,	12	1
Dec. 5	Swift well,	After disinfection,	12	0
Oct. 10	Stevens well,	Typhoid on property,	4	0
Nov. 27	Stevens well,	Typhoid on property,	200	4
Oct. 10	Walker well,	Before disinfection,	540	24
Oct. 17	Walker well,	After disinfection,	40	0
Oct. 10	Albert, well,	Typhoid on property,	4	0
Oct. 17	Peters well,	Tphoid on property,	16	0
Oct. 17	Gingerg well,		120	0
Oct. 17	Brown well,		20	0
Oct. 17	Baker well,		30	0
Oct. 17	Hinchcliffe well,	Typhoid on property,	70	0
Oct. 17	Livingstone well,	Typhoid on property,	160	0
Oct. 19	Sterling well,	Typhoid on property,	40	0
Oct. 27	Trump well,	Typhoid on property,	2,100	0
Oct. 27	Lansberry tap,		700	2
Oct. 27	Shugart well,		300	16
Oct. 27	Ross well,		11,000	16
Oct 10	Frogtown spring,		8	0

The results of disinfection of the wells are shown in this table. Frogtown spring was used quite freely.

The Beard well is twelve feet deep; the wooden platform over it was out of repair. Kitchen drainage and slops from the house were thrown on the ground, within a few feet of the well. The privy vault, eighty feet distant and at a higher elevation, was full and overflowing. The physical conditions point to an almost certain contamination of the water. The analyses confirmed this opinion.

Milk Supply.

Mr. Ritter had the following to say in his report about the milk supply:

"Woodland has but one dairyman, A. J. Eshleman, who resides in Bradford Township, about one and one-half miles south of Woodland. He is the owner of seventeen cows and retails eighty to one hundred quarts of milk daily in the village of Woodland to eighty-nine families. He does not use ice as he has a very good spring house which is cool during the hottest weather. He gets his water supply from a spring on the hillside, 400 feet distant from the barn. The spring is fairly protected and the water is carried to the house by a pipe. There are no occupied estates above the spring nor is there any evidence of pollution. There has never been any typhoid fever on the premises. The milk bottles are all sterilized and I consider the milk supply above suspicion."

Typhoid Fever in Woodland.

In the following table is given, as near as could be ascertained, the list of typhoid fever cases for the last four years, including 1910. It will be seen that the disease has been confined to the summer months, there being no fever to amount to anything outside of July, August, September and October during these years. This is the fly season and the one in which out of door pollutions abound. At the same time, owing to insanitary conditions and careless practices with respect to the disposition of household wastes, it is strange that the fever should not have occurred in other months besides that of summer and early fall:

Woodland Village Typhoid Statistics.

Month.	Cases by Month.			
	1907.	1908.	1909.	1910.
January,	0	0	1	0
February,	0	0	0	0
March,	0	0	0	0
April,	0	0	0	0
May,	0	0	0	0
June,	0	0	2	0
July,	0	1	1	1
August,	7	2	1	10
September,	0	4	0	13
October,	4	7	0	12
November,	0	0	0	0
December,	0	2	0	0
Total,	11	16	5	41

The outbreak of 1910 was confined to Woodland and the village of Bigler. There were five cases of fever in Bigler, three of which were doubtless contracted in Woodland and the other two cases were of secondary origin. Beyond this there was little typhoid fever even in the entire county having a population of 94,000. For the entire year in Clearfield County there were reported 229 cases only, 46 of them are attributed to Woodland. Of this total number for the county throughout the year 146 only came from rural districts, so that deducting the 46 cases for Woodland, leaves 100 cases of typhoid fever to be distributed through all the townships of the county for the entire year. During August, when there were eleven cases in Woodland, there were four other only for all the other townships in the county, and in September, when there were twenty cases in Woodland, there were five additional cases only distributed among all of the townships of the county. In the following table by months for the year 1910, are given the cases reported from the five townships surrounding Bradford Township in which Woodland village is located, from the two boroughs of Clearfield and Wallaceton and also the grand total from urban and rural districts of the county and also Bradford township. There were five cases occurring in Bradford Township in parts remote from Woodland:

Typhoid Fever Cases reported to State Department of Health from Woodland Village and surrounding territory, 1910.

Month.	Townships.				Boroughs.		Totals for county			Bradford twp.—Woodland village.
	Graham.	Morris.	Lawrence.	Boggs and Girard.	Clearfield.	Wallaceton.	Urban.	Rural	Grand total.	
January,	0	0	0	0	1	1	3	23	[illegible]	0
February,	0	0	0	0	0	0	0	0	0	0
March,	0	0	0	0	0	0	0	0	0	0
April,	0	0	0	0	0	0	1	0	1	0
May,	0	0	0	0	0	0	0	0	0	0
June,	0	0	0	0	0	0	0	0	0	0
July,	0	0	0	0	3	0	4	0	4	1
August,	0	4	0	0	4	0	16	15	31	11
September,	0	1	4	0	4	0	30	26	56	20
October,	3	1	0	0	4	0	26	41	67	14
November,	0	0	1	0	1	0	2	41	43	0
December,	0	0	0	0	0	0	1	0	1	0
Total cases,	3	6	5	0	17	1	83	146	229	46
Population,	663	4,994	4,024	1,760	6,851	324	34,000	60,000	94,000	
Township,										2,250
Village,										758

The data of the forty-one cases in Woodland and Bigler are given in the following table:

Typhoid Fever Cases canvassed in Woodland and Bigler Villages, 1910.

No.	Date of Onset.	Name of Patient	Age.	Occupation.
1	July 20	Gladys Hains, Main street,	8	School.
2	Aug. 2	Florentine Wilson, Main street,	8	School.
3	Aug. 15	Geo. Freeman, Bigler street,	53	Invalid.
4	Aug. 16	Kenneth Shivery, Main street,	15	School.
5	Aug. 20	Mrs. Anna Swift, Main street,	24	Wife.
6	Aug. 22	Nancy Learish, Main street,	12	School.
7	Aug. 23	Paul Komoncy, Main street,	30	Laborer.
8	Aug. 26	Burten Shivery, Main street,	17	School.
9	Aug. 27	James Heise, Woodland street,	15	Laborer.
10	Aug. 27	Theodore Hains, Main street,	29	Liveryman.
11	Aug. 30	Mrs. M. Graffius, Lower W.,	21	Wife.
12	Sept. 1	Joe Komoncy, Main street,	3	Child.
13	Sept. 1	Elsie Hinchcliffe, Woodland,	21	At home.
14	Sept. 12	Tony Notali, Main street,	22	Laborer.
15	Sept. 13	Leonard Learish, Main street,	21	Bell Telephone.
16	Sept. 13	Della Odgen, Woodland,	20	Teacher.
17	Sept. 14	Alice Peters, Bigler,	12	School.
18	Sept. 15	Lulu Wisor, Woodland,	20	Wife.
19	Sept. 15	Sydney Trump, Bigler,	16	Laborer.
20	Sept. 17	Isabella Shearer, Main street,	16	School
21	Sept. 18	Elizabeth Luzier, Main street,	35	Wife.
22	Sept. 19	Velina Hains, Main street,	6	School.
23	Sept. 19	Guy Stephens, Main street,	16	Laborer.
24	Sept. 19	Chas. Stevens, Main street,	27	Laborer.
25	Sept. 19	Lehman Stevens, Main street,	5	Child.
26	Sept. 19	Grace Albert, Woodland,	15	School.
27	Sept. 19	Mrs. Minnie Barger, Main street,	23	Wife.
28	Sept. 19	Chas. Wisor, Woodland,	25	Laborer.
29	Sept. 22	Saml. Eckley, Main street,	28	Livery Stable.

No.	Date of onset.	Name of Patient.	Age.	Occupation.
30	Oct. 1	Ralph Sterling, Woodland,	32	Boss, Brick Works.
31	Oct. 4	Bessie Luzier, Main street,	10	School.
32	Oct. 5	Saml. Livingstone, Main street,	50	Laborer.
33	Oct. 8	Albert Luzier, Main street,	8	School.
34	Oct. 11	Howard Peters, Main street,	24	Laborer.
35	Oct. 12	Julia E. Heise, Woodland,	12	School.
36	Oct. 14	Floyd Barger, Main street,	6	Child.
37	Oct. 15	Clement Trump, Bigler,	14	School.
38	Oct. 19	Chester Trump, Bigler,	9	School.
39	Oct. 22	Mrs. Louise Learish, Main street,	30	Wife.
40	Oct. 26	Chas. Green, Woodland,	28	Laborer.
41	Oct. 31	Mrs. Anna Heise, Woodland,	39	Wife.

Milk and Water Supply, and Sewage Disposal of these families.

No.	No. in family.	Water Supply.		Sewage Disposal.		Milk.
		Well.	Spring.	Privy.	Sewer.	
1	5	Dug,		Surface,	Sewer,	Own cow.
2	9	Dug,		Vault,		A. Dugan.
3	2	Dug,		Vault,		
4	4	Dug,		Vault,	Sewer,	A. Dugan.
5	3	Dug,		Vault,		S. S. Swift.
6	9	Dug,		Vault,		A. Dugan.
7	7	Dug,	Cold Spring	Vault,		Eshleman.
8	4	Dug,		Vault,	Sewer,	A. Dugan.
9	7	Dug,	Spring,	Surface,		Eshleman.
10	5	Dug,		Surface,	Sewer,	Own cow.
11	4	Dug,		Vault,		E. Peters.
12	7	Dug,		Vault,		Eshleman.
13	3	Dug,		Vault,		Eshleman.
14	2	Dug,	Cold Spring	Vault,		Eshleman.
15	4	Dug,		Vault,		Eshleman.
16	4	Dug,	Frogtown,	Vault,		
17	4	Dug,		Surface,		
18	3		Cold Spring,	Surface,		A. Wisor.
19	6	Dug,		Vault,		Own cow.
20	3	Dug,		Vault,		W. Lansberry.
21	7	Drilled,	Cold Spring,	Surface,		Eshleman.
22	5	Dug,		Surface,	Sewer,	Own cow.
23	4	Drilled,	Spring,	Vault,		Eshleman.
24	4	Drilled,	Spring,	Vault,		Eshleman.
25	6	Dug,	Cold Spring	Vault,		Eshleman.
26	5	Dug,		Vault,		Eshleman.
27	2	Dug,		Vault,		Eshleman.
28	4		Cold Spring	Surface,		Eshleman.
29	5	Dug,		Surface,	Sewer,	Own cow.
30	4	Dug,	Cold Spring	Vault,		Eshleman.
31	7	Drilled,	Frogtown,	Surface,		Eshleman.
32	10	Dug,	Cold Spring,	Vault,		Eshleman.
33	7	Drilled,	Frogtown,	Surface,		Eshleman.
34	5	Dug,	Frogtown,	Surface,		Eshleman.
35	7	Dug,	Spring,	Surface,		Eshleman.
36	8	Dug,		Vault,		Rowel.
37	6	Dug,		Vault,		Own cow.
38	6	Dug,		Vault,		Own cow.
39	9	Dug,		Vault,		A. Dugan.
40	5	Dug,	Cold Spring,	Vault,		Eshleman.
41	7	Dug,	Spring,	Surface,		Eshleman.

Age Periods.

Age Period—Years.	Cases.		
	Male.	Female.	Total.
0- 4,	1	0	1
5- 9,	4	3	7
10-14,	1	4	5
15-19,	5	2	7
20-24,	3	6	9
25-29,	5	0	5
30-34,	2	1	3
35-39,	0	2	2
40 and over,	2	0	2
Total,	23	18	41

The following is a summary of the work done by the inspectors in abating nuisances:

Number of properties inspected,	204
Number of properties satisfactory,	126
Number of properties unsatisfactory,	78
Population,	788
Pollutions,	66
Nuisances,	29

Mr. Ritter in his report had the following to say about remedies effected:

"When we arrived at Woodland on October 6th, the general sanitary conditions were bad. The county commissioners and township supervisors were called upon to assist us in relieving the situation. A liberal supply of freshly burned unslaked lime was furnished by the county commissioners and distributed and scattered throughout the village by the supervisor. The supervisor also cleared out all the ditches and drains within the village. Lime was used freely in every privy vault and all nuisances that were a menace to the public health were abated. Cold Spring was condemned as a dangerous water supply and was closed. Some of the wells which were found to contain B. Coli were disinfected and all possible sources of contamination abated, after which duplicate collections of water were made and sent to our laboratories."

Dr. Hunt has prepared a report on the services rendered by himself and the nurses in suppressing the epidemic.

38. TYPHOID FEVER AT CONNELLSVILLE.

During August, typhoid fever cases occured in increasing numbers, continuing through September, October and November, totalling seventy-four cases in all. The local Board of Health requested the State Commissioner of Health to send an engineer to inspect the water works system and asked that the water supply be examined bacteriologically by the Department. The local authorities were informed that an investigation would be made as soon as possible, but that the borough must employ a chemist to analyze the drinking waters of the town. On October 12th, the members of the Board of Health of Connellsville reported at a meeting of the physicians of the neighborhood that the State Department of Health had refused to make water analyses because of lack of laboratory facilities, whereupon the following resolution was adopted:

"Whereas since the State Health Commission, which has received millions of dollars in appropriation from this State, has refused to make bacteriological examination of city water, we recommend that the local Board of Health obtain specimens of water from different locations and have them examined by a competent bacteriologist."

On October 19th, Assistant Engineer Ralph Irwin, was detailed to make an examination of the public water supply and the local situation in Connellsville. The following letter of explanation was handed to the President of the Board of Health:

"Dr. S. McKee, President Board of Health, Connellsville, Pa.

"Dear Doctor: I am sending an assistant engineer to your town to investigate the water supply and to look into the origin of the cases of typhoid fever there. He is the only man available at this time and up to now he has been engaged in making similar investigations of other outbreaks in the State. As I have explained in a previous letter, we have been overcrowded with typhoid fever work this summer and there are a large number of places with this disease requiring State assistance. It was with no wish to slight Connellsville that I acquainted you with the facts in my letter of September 30th. When exigencies arise we have to do the best we can and if people do not like it, the fault is not ours. I have had no further communication from your board on the subject but some one has sent me a copy of the newspaper containing a copy of a resolution passed by the medical society, the spirit of which was not what it should have been under the circumstances. You should be aware of the fact that the State laws relative to the Health Department do not relieve the local Board of Health one iota of their responsibilities, and while we are glad to extend assistance in any case when possible, when circumstances prevent this assistance being given, the last body to find fault, should be the local Board of Health.

"Yours truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

The following is a report of the investigations:

Typhoid Fever Cases reported by the Local Board of Health of Connellsville, Fayette County, to the State Department of Health.

	1906.	1907.	1908.	1909.	1910.
January,	1	4	0	2	0
February,	0	1	0	1	2
March,	3	0	0	1	0
April,	1	0	2	2	0
May,	0	1	0	1	0
June,	0	1	3	0	0
July,	0	0	3	5	4
August,	0	10	1	5	22
September,	7	5	20	13	22
October,	0	10	0	11	17
November,	0	9	3	11	13
December,	4	1	4	6	2
	16	42	36	58	82

Existing Water Works.

the east bank of the Youghiogheny River, but a part, formerly the borough of New Haven, and annexed to Connellsville in 1909, is located on the west bank of the river. The town is in the north central part of Fayette County in what is known as the "Connellsville Coke District."

Within a radius of ten miles of the borough there is a district population of 90,000, principally engaged in coal and coke operations.

In the borough besides coking there are other industries among which is the Sligo Iron and Steel Company, employing 350 men; Connellsville Machine and Car Company, employing 100 men and the Baltimore and Ohio classification yards, buildings and offices; and several smaller works. Adjacent to the borough to the south, in Connellsville Township, is the plant of the American Sheet and Tin Plate Company, where are employed several hundred hands when the works are in operation.

The old part of the borough is built on two hills, one in the north and the other in the south part and between them is Connells Run.

North of the north hill but still in the borough is Mounts Creek and south of the south hill and within the borough limits is Trump Run. The northern hill is elevated about 300 feet above the river and the southern hill about 150 feet above the river at its highest point in the borough.

Connells Run has a water shed of about four square miles. It rises to the east in Chestnut Ridge Mountains and flows in a westerly direction through the borough into the river. Its upper waters are used as a source of supply of water to a part of the borough.

Mounts Creek is a considerable stream. It has an area of about twenty-seven square miles. Its numerous tributaries arise in the Chestnut Ridge Mountains and on one of its tributary streams there is a small intake which impounds water for public use in the borough of Scottsdale, and another tributary, Breakneck Run, supplies water to a part of Connellsville. Below these dams on the watershed are a few coal mines and numerous coke ovens from which acid wastes go to the streams.

There is in Connellsville an extensive system of public sewers largely combined and there are important private sewers. The compulsory connection with the sewers has not been enforced, so it is reported. There are in the neighborhood of 500 privies of the shallow earth type in use. However, there are but few individual wells on private property. Most of the individuals derive their drinking water from the public system which is owned by the Connellsville Water Company.

The original water works of the company were built in 1884 and 1885. They were situated below the borough and the water pumped was consequently polluted with sewage from the borough. The present pumping station was built in 1898. It was located about two miles above the city on the east bank of the river. The filtration system was installed in 1900 by the New York Continental Jewel Company.

The water company supplies consumers in the township of Connellsville and in the villages of Swagertown and Poplar Grove. These places are small suburbs northeast of Connellsville in Bullskin Township, and have a population of about 200 and 150 respectively. It is estimated that there is in the neighborhood of 1,500 persons in the water district. There have been 2,862 service connections made with the mains in the borough, forty in Swagertown and thirty in Poplar Grove. These services supply about ninety-five per cent. of the population in Connellsville excepting the southern portion having a population of about 1,500 where sixty-five per cent. only of the people are supplied. In Swagertown and Poplar Grove all of the people are supplied with public water, so it is reported. It is estimated that there are about 175 wells in the borough.

The Company's sources are three in number, namely; Connels Run reservoir, Breakneck Run reservoir and the Youghiogheny River.

The Connels Run reservoir sometimes called McCoy reservoir is formed by an earthen dam which stores five million gallons of water, has a tributary area of about two square miles and is sparsely populated. There are upon the watershed seven occupied estates and a total resident population of twenty-two persons and no pollutions. The water from this reservoir is used to supply the low service section of the town. A ten inch main extends down the valley of the run and is joined by an eight inch main from Breakneck reservoir to the north. Neither of these two waters is filtered.

Breakneck reservoir is located on Breakneck Run or Pole Cat Run which is tributary to Mounts Creek and immediately south of Butler Run (a tributary from which water is supplied by gravity to the borough of Connellsville). The Breakneck dam is an earthen structure about 25 feet high impounding fifteen million gallons of water delivered from a watershed of three and a half square miles upon which there is a resident population of eighty-six persons on a total of twenty-three occupied estates, and one church and two schools. All but six of these properties were in a satisfactory condition. This reservoir is used to supply the high service district in Connellsville. This system of pipes is operated entirely separate from the other systems but there are valves by means of which water from Breakneck Run can be admitted to the low service system through the eight inch pipe connection already mentioned and at other points. There are 556 service connections made to the pipes supplied by water from the Breakneck reservoir, and the population of this high service district is about 2,700 persons. An eight inch main delivers the water into town.

The main supply is obtained from the Youghiogheny River The intake and pumping station are located just below where Laurel Run empties into the Youghiogheny River. A small dam about two feet high extends across this stream 100 feet in the rear of the pumping station and from it is a sixteen inch pipe connected to the clear water reservoir of the filter plant.

Laurel Run was formerly used as a source of supply. It was stated by the Superintendent of the Water Company that this source had not been used during the year 1910. The water shed area is about two square miles of mountain territory upon which there are eight occupied estates on which reside thirty-six persons.

A sanitary patrol is maintained by the water company on the watersheds of Connels Run, Breakneck Run and Laurel Run and the reports are submitted weekly to the company.

Water from the river is admitted into a sedimentation basin, thence it flows by gravity to mechanical filters and thence to a filtered water basin, all in the vicinity of the pumping station. The purified water is then raised into the distributing system in the town. Somewhere in the distributing system the filtered waters from the Youghiogheny meet the raw gravity waters from Connels reservoir. It is estimated that about forty per cent. of the supply to the low service district is furnished from the Connels Run, and that the other sixty per cent. is pumped into the system from the filter plant.

The Youghiogheny River is reasonably free from sewage and mine drainage pollution above Connellsville. It is known that tanneries, lumber camps and small settlements abound on the banks of the stream. As far as the Department is aware, the borough of Somerset in Somerset County is the only municipality within Pennsylvania having a sewer system from which sewage is discharged into the river or a tributary. The borough's sewage goes into Coxes Creek which in turn flows into Casselman River. The point of the discharge of sewage is fifty miles above Connellsville.

The Youghiogheny River heads in Preston County, West Virginia, some thirty miles or more south of the Pennsylvania State line, and discharges into the Monongahela River at McKeesport. It has a general northerly flow to as far as Confluence borough, Pa., when it turns northwest and continues in that direction to its mouth. From its source in the Great Savage Mountains, the drainage area is sparsely settled and a generally wooded, mountain territory until near Connellsville. The headwaters are rapid and it is a typical mountain stream with its bed having numerous falls and rapids. After the stream reaches the Pennsylvania State line, the flow becomes more uniform and continues as such to the mouth but the flow is broken in this distances by various rapids among which the largest one is at Ohiopyle Borough. The total territory drained by the river is about 1,800 square miles of which some 1,300 are in Pennsylvania. Above Connellsville the drainage area is at least 1,000 square miles. The population on the whole shed below Connellsville increases rapidly.

The principal tributaries, Casselman River, Laurel Creek and the upper Youghiogheny River unite to form the main stream at Confluence borough, which in provincial times was known as Turkeyfoot settlement. The Casselman River receives the drainage from quite a number of coal mines, but it appears that the sulphur waters are largely polluted before Connellsville is reached.

Below Connellsville, Jacobs Creek, a highly acid polluted stream and the Big Sewickly Creek, which is also impregnated with acid mine waste are the principal tributaries. This part of the Youghiogheny River to waste are the principal tributaries. This part of the Youghiogheny River to its mouth is reported to be more polluted than any other stream in Pennsylvania. The amounts of suspended and dissolved matters carried in the waters are excessive. The gross pollutions begin in Connellsville borough.

Between the intake of the Connellsville Water Company and the borough of Connellsville, but on the west bank of the Youghiogheny River there are the intakes of two other water companies. They are in order the Trotter Water Company and the Southwest Water Company. The Trotter Water Company has two pumping houses on the river, but the other one is below Connellsville. The water is pumped to various coal mines in the region.

The Southwest Water Company takes crude water and furnishes it to the various plants operated by the Oliver and Snyder coal and coke interests, including the settlements at the mines.

Filter Plant.

At the Connellsville Water Company station there are two pumps used to lift the water from the river to the sedimentation tank. One is a Stillwell and Bierce compound condenser pump with a capacity of 2,500,000 gallons a day. The other is a simple Blake high pressure pump of 2,500,000 gallons capacity a day. A 12 inch pipe extends from each of these to the 16 inch discharge to the sedimentation tanks. There are two high pressure pumps. One is a Worthington triple expansion pump with a capacity of 2,500,000 gallons a day. The other is an Epping-Carpenter triple expansion pump with a capacity of 3,000,000 gallons a day. The suction pipe from the clear water well to the high pressure pumps is 16 inches in diameter and the discharge to the city is a 16 inch pipe. The steam power for the pumps is obtained from three McNeil tubular boilers of 100 horse power each. Two of these boilers are used at the same time, the other being held as an auxiliary. About 150 horse power is consumed by the pumps.

The sedimentation tank is located outside the filter building and is an uncovered steel tank 21 feet deep at the center, 20 feet deep at the circumference and 50 feet in diameter. The 16 inch inlet pipe is flared at the end to 23 inches and empties at the top and in the center of the tank. A circular steel baffle wall 16 feet in diameter extends to a depth of ten feet from the top of the tank. A 16 inch outlet pipe extends from the feeding trough at either side and these pipes connect with the 20 inch supply pipe to the filter house where the pipe is reduced to 16 inches. The feeding trough extends around the circumference of the tank. It is eight inches deep, six inches wide midway between the outlets and two feet six inches wide at the outlets. The top of the trough is 14 inches below the top of the tank. A 12 inch flush pipe extends from the bottom of the tank to the sewer leading to Laurel Run.

There are two tanks used for feeding alum and one for feeding lime to the raw water. These tanks are located in an annex to the filter building.

The alum tanks are three feet in diameter and five feet high with a feeding capacity of 52 inches. There are no agitators on the tanks. A mixing box 12 inches by 24 inches and 12 inches deep with a perforated false bottom is situated on top of these tanks and feeds into either one. A one inch pipe extends from each tank to a water jet which forces the alum solution into the pipe leading to the sedimentation tank at a point about 100 feet from the pumps.

The lime tank is 30 inches by 24 inches and 30 inches deep. A half inch pipe extends from the discharge main to the bottom of the lime tank, and a 1.5 inch overflow pipe extends to the water jet through which the lime and alum solution are introduced to the raw water. A slaking box 12 inches by 24 inches and 12 inches deep is situated on top of this tank.

There are three filter units. These are cylindrical pressure filters made by the New York Continental Jewell Co. They are, however, used as gravity filters. They are built directly over the clear water well. The filters are 30 feet long and eight feet in diameter. The inlet to each filter is an eight inch pipe, and the outlet is an eight inch pipe leading directly to the clear water well. The inlet pipe branches inside the filter to four six inch pipes which extend upward to the distributing trough extending the length the length of the filter. This trough is 14 inches wide and six inches deep and 14 inches above the surface of the sand. A 6 inch branch from the wash line, which is a six inch pipe from the discharge main, extends to each filter. A four inch rewash pipe, a four inch overflow and a 10 inch sewer pipe extend to the main sewer. The manifold emptying into the outlet pipe is elliptical, six inches by four inches, and the laterals are one inch pipes. There are 820 strainers in each unit. The manifold system is laid in cement, the top of the outlet pipe being six feet from the top of the filter. Eight inches of gravel and 40 inches of sand at the center line were placed on top of the manifold system, the top of the sand being two feet from the top of the filter. There are 212 feet of filtering surface in each filter. The filters contain no agitating apparatus. In the effluent pipe of each unit a pressure gauge has been installed to ascertain the pressure on the sand during washing.

The clear water well is located directly underneath the filters. It is built of brick and cement and is 35 feet by 43 feet six inches and 10 feet deep with a capacity of about 114,000 gallons.

The amount of water filtered depends largely on the amount of water obtained from the Connel Run reservoir gravity supply. The time of operation of the filters varies from 14 to 24 hours per day, with an average filtration of about 1,400,000 gallons when the filters are operated 24 hours. The fiters are supposed to have a capacity of 750,000 gallons per day each or 2,250,000 gallons total.

The capacity of the sedimentation tank is about 293,000 gallons. Taking the maximum amount of filtration per day as 1,841,000 gallons, this would mean a change of water 6.3 times a day or a sedimentation period of about three hours and 50 minutes. This seems to be sufficient for the present consumption.

The strength of the alum solution depends upon the turbidity of the raw water. This turbidity is obtained by dropping a stick with a platinum wire into the tank of water. This tank is about one foot wide and four feet deep. The depth to which the wire is visible gives the turbidity of the water according to Hazen's standard. The apparatus is in the filter building and the method of obtaining the turbidity is only approximate and as the light used for the determination is ordinary daylight it is sure to be unreliable on cloudy days. Operations such as these should be performed under constant conditions.

In clear water 100 pounds of alum are dissolved in a tank and according to the turbidity the amount is increased up to 150 pounds per tank. From six to eight inches of solution is used per hour. The regulation of the amount of alum used seems to be arbitrary although of course depending to a certain extent on the turbidity. The fact that the alum tanks are so large and that there are no agitators on them makes it doubtful whether the attendant uses sufficient care in mixing his solution to have a constant solution.

The method of applying the lime solution is very crude and unreliable. From 20 to 24 pounds of lime is placed in the slaking box. About once an hour the operator adds water to the lime and as stated by him aims to introduce about two pounds of the lime to the large solution tank. The solution in this tank is then stirred by hand and receives no further attention for an hour. Water is kept constantly running into the bottom of the tank and the overflow is introduced into the raw water. It is readily seen that the solution becomes constantly weaker and at the end of the hour is probably nothing but water.

The alkalinity of the water averages from four to seven. It is not considered advisable to introduce alum into the water containing less than 5 parts of alkalinity without a sufficient addition of alkali to decompose the alum. It is very evident that this is not done in the pipe leading to the sedimentation tank and reliance must be had that this mixture takes place in the sedimentation.

The lime solution should be a constant one so that a thorough mixture be obtained in the raw water. The solution should be added in such amounts as to be sufficient to neutralize the alum when the alkalinity is not more than five parts.

Reports show that from 2 to 5 washings of the filter are made each day. The filters are washed with filtered water from the force main. No agitation of the filter bed by mechanical arrangement is attempted. It is claimed that a pressure of 4.5 pounds during washing is maintained, equivalent to 1500 gallons of water a minute. With a surface of 212 square feet, this would be equivalent to seven gallons of water a square foot each minute. This is hardly sufficient and should be increased to 10 gallons a square foot or 2,000 gallons a minute.

The filters are washed from five to eight minutes and are immediately rewashed for five minutes after which the water is conducted to a clear water well. No care is taken to slowly introduce the water to the filters for washing or to slowly cut off the same. The filters in the past have become clogged until unable to filter the water, and it is likely that this will continue to happen under existing conditions. Particularly before washing, the filtrate is slightly turbid, probably to breaks in the filter blanket.

Bacteriological analyses of water in Connellsville. The engineers of the Department made an efficiency test of the Connellsville filters early in the year 1909. In the following table results of the analysis of water collected at that time are given:

Public Water Samples and Results, Department Laboratory.

Date collected.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
1909.			
April 7	Raw water, Youghiogheny river, at filter plant,	100	0
7	Raw water, Youghiogheny river, at filter plant,	400	2
8	Raw water, Youghiogheny river, at filter plant,	280	0
8	Raw water, Youghiogheny river, at filter plant,	200	0
7	Sedimentation tank effluent,	24	0
7	Sedimentation tank effluent,	20	0
8	Sedimentation tank effluent,	2,400	0
7	Tap, filter No. 1, before washing,	2	0
8	Tap, filter No. 1, before washing,	4	0
7	Tap, filter No. 1, after washing,	10	0
8	Tap, filter No. 1, after washing,	210	0
8	Tap, filter No. 2, before washing,	350	0
7	Tap, filter No. 2, after washing,	0	0
7	Tap, filter No. 2, after washing,	32	0
8	Tap, filter No. 2, after washing,	2	0
7	Tap, filter No. 3, before washing,	0	0
7	Tap, filter No. 3, after washing,	30	0
8	Tap, filter No. 3, after washing,	8	0
8	Tap, filter No. 3, after washing,	1,200	0
7	Tap, Hotel Yough,	600	0
8	Tap, Wyman Hotel,	51	0
8	Clear water basin,	28	0
7	Laurel Run, at filter plant,	18	0
8	Tap, Breakneck reservoir supply,	6,000	0
1910.			
Oct. 21	Tap, filter No. 2,	1	0
21	Tap, Hotel Royal,	0	0
21	Tap, No. 114 Eighth St.,	3	0
21	General effluent,	23	0
24	Tap, Wm. Gillett, 304 Eighth St.,	6	0

It will be noted that in but one case was sewage pollution found in the raw river water and none appeared in the filtered water or in the sample collected from Laurel Run and Breakneck Run. Also in the table are given results of analyses of samples collected by Mr. Irwin in 1910.

The water company chemist exercises special supervision from August 12th to October 12th, during which period typhoid fever was prevalent in Connelsville and vicinity In the following table the results of analyses are given. They show that once only, out of 13 samples for this period, did raw Youghiogheny River water show the presence of sewage organisms. Once only were they present in the clear water basin and once only at the Breakneck reservoir.

Analysis by Water Company 1910.

Date collected.	Name.	Bacteria Per C. C. Total.	Bacteria Per C. C. B. Coli.
Aug. 12	Youghiogheny river,	104	Absent.
15	Youghiogheny river,	120	Absent.
18	Youghiogheny river,	240	Absent.
22	Youghiogheny river,	105	Absent.
25	Youghiogheny river,	170	Absent.
29	Youghiogheny river,	140	Absent.
Sept. 12	Youghiogheny river,	69	Absent.
15	Youghiogheny river,	80	Absent.
19	Youghiogheny river,	110	Present.
22	Youghiogheny river,	130	Absent.
26	Youghiogheny river,	38	Absent.
Oct. 12	Youghiogheny river,	200	Absent.
15	Youghiogheny river,	182	Absent.
Aug. 12	Clear water basin underneath filters,	19	Absent.
15	Clear water basin underneath filters,	30	Preseent.
18	Clear water basin underneath filters,	1	Absent.
22	Clear water basin underneath filters,	14	Absent.
25	Clear water basin underneath filters,	24	Absent.
29	Clear water basin underneath filters,	14	Absent.
Sept. 12	Clear water basin underneath filters,	7	Absent.
15	Clear water basin underneath filters,	7	Absent.
19	Clear water basin underneath filters,	5	Absent.
22	Clear water basin underneath filters,	4	Absent.
26	Clear water basin underneath filters,	4	Absent.
Oct. 12	Clear water basin underneath filters,	150	Absent.
16	Clear water basin underneath filters,	29	Absent.
Aug. 12	Breakneck reservoir,	65	Absent.
15	Breakneck reservoir,	80	Absent.
18	Breakneck reservoir,	430	Absent.
22	Breakneck reservoir,	960	Present.
25	Breakneck reservoir,	550	Absent.
29	Breakneck reservoir,	480	Absent.
Sept. 12	Breakneck reservoir,	240	Absent.
15	Breakneck reservoir,	30	Absent.
19	Breakneck reservoir,	16	Absent.
22	Breakneck reservoir,	4	Absent.
26	Breakneck reservoir,	8	Absent.
Oct. 12	Breakneck reservoir,	34	Absent.

There is nothing indicated by the above analyses that points to a waterborne infection of typhoid fever in the public water supply and this opinion is corroborated by further evidence.

Distribution of Typhoid Fever Cases.

Of the 75 typhoid fever cases canvassed by the Department, 24 were in Old Connellsville and 51 were in the new district, formerly New Haven borough, separated from Old Connellsville by the Youghiogheny River. The New Haven district received filtered water, possibly mixed with some Connells Run reservoir water.

Of the 24 cases in the old town, six were on the high service supply from Breakneck reservoir and the other 18 were on the low service, receiving Connells reservoir water or filtered water.

There were no cases of typhoid fever for the year on Breakneck Run watershed, or on Laurel Run watershed, so far as the Department could ascertain. Therefore, this fact and the quality of the water sampled and analyzed, and the few cases in the old town that got the filtered water first, and the distribution in point of on-set of the 6 cases on the high service stretching from July 16th to October 8th, the cases in the low service district being spread out over the same interval of time, are confirmatory of the conclusion that the infection was not spread through the medium of the public water. In the following table the cases by date of onset, as ascertained by Mr. Irwin's canvass, are shown:

Date of Onset Typhoid Fever Cases in Connellsville—1910.

	June.	July.	Aug.	Sept.	Oct.	Unk'wn.
1,			3	1	3	1
2,						
3,				2		
4,		1				
5,			2	1		
6,				3	4	
7,			1	2	2	
8,			1		1	
9,			1		1	
10,				7		
11,						
12,				2		
13,			1			
14,			1	2	1	
15,			1	2		
16,		1				
17,						
18,	1	1	1	2		
19,						
20,		2		3		
21,			2			
22,				2		
23,						
24,				1		
25,	1	2	2			
26,		1	1	2		
27,		1				
28,						
29,		1				
30,			1			
Total,	2	10	18	32	12	1

Cases According to Age and Sex.

Age.	Male.	Female.	Total.
0-4,	4	4	8
5-9,	8	8	16
10-14,	7	8	15
15-19,	5	6	11
20-24,	3	1	4
25-29,	3	3	6
30-34,	2	2	4
35-39,	2	2	4
40-44,	2		2
45-49,	3		3
50-over,	2		2
Total,	41	34	75

Eighteen of the patients were school-children in attendance at eight different schools Seventeen of them were children living at home and seven were housewives. Seven were unemployed, living at home. The 26 remaining cases comprised 14 different occupations.

Relative to the milk supply, 33 cases were supplied by 13 different milk dealers. Eleven patients obtained their milk from neighbors, eight from their own premises, 10 cases used no milk or condensed milk and in 13 instances the milk supply was not ascertainable. In five families 18 cases occurred.

Private Water Supplies.

In the following table are given the analysis of three private well supplies and two ice supplies. The wells were examined because water from them had been drawn and used by citizens in the neighborhood, among which there were typhoid fever cases.

Private Well and Public Ice Supplies, Department Laboratories.

Date.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
1910.			
Oct. 21	Buchanan well,	350	0
21	Stauffer well,	450	0
24	Ice, Youghiogheny Crystal Ice Co.,	240	0
24	Ice, Youghiogheny Crystal Ice Co.,	16	0
24	John Leposky well (Church),	80	0

Fifty-three patients used public water only, eleven used public water and some well or spring water. All of the patients obtained city water, but 11 of them travelled outside of the city and drank water from numerous places.

Sewers and General Sanitation.

The sewer outlets in the borough discharge into the river and the creeks. The outlets into the river named in order up stream from the mouth of Mounts Creek are as follows:

Mounts Creek Intercepter 24 inches in diameter.
Peach Street 24 inch outlet.
Grape Alley 24 inch outlet.
Apple Street 12 inch outlet.
Main Street 24 inch outlet.
Church Place 15 inch outlet.
Connell Run intercepting sewer 30 inches in diameter.
Trump Run intercepter 18 inches in diameter.

The above sewers are all public outlets.

The 24 inch intercepting sewer which extends up Mounts Creek valley has an outlet into the river at a point 400 feet down stream from the mouth of Mounts Creek. The pipe is imbedded in a stone protective work. During high water the sewer is submerged and the water backs up some distance. The distance served is largely a residential one. It includes a stretch about half a mile in length along the river. As far up as Peach Street in which there are about 7.5 miles of sewers, .40 per cent. are eight inches in diameter and 66 per cent. are fifteen inch pipes or less, the balance comprising sizes ranging from eighteen inches to twenty-seven inches in diameter. The only public sewer outlet into Mounts Creek is an overflow on the Mounts Creek sewer line, located at the foot of Frances Avenue, over half a mile inland. At times of high water when the sewer is surcharged, the sewage from the greater part of the district tributary to this line overflows at this point.

The 24 inch Peach sewer outlet emerges from the retaining wall or cribbing adjacent to the Baltimore and Ohio Railroad tracks and just above the passenger station. This sewer is the river outlet for district No. 1 above descried. How many of the 7.5 miles of sewers in the system empty through the Peach Street outlet and how many of them discharge into the Mounts' Creek intercepter, is unknown to the Department. At low water sewage sediment collects in pools along the retaining wall and produces disagreeable odors. Their territory is densly populated.

The Peach Street, Grape Alley, Apple, Main and Church Street outlets all serve district No. 2, which is in the heart of the city and has a river frontage of about a quarter of a mile immediately opposite the borough of New Haven. Main Street is the principal thoroughfare of the town back from the river, and there is a highway bridge to New Haven borough at the foot of this street. The four sewer outlets mentioned all discharge from the retaining wall and at low water accumulations of sewage matter at the outlets cause a nuisance along Water Street.

In district No. 2 there are two and a half miles of sewers tributary to the four outlets of which 82 per cent. are 15 inches in diameter or under.

The 30 inch Connell Run intercepter discharges into the river near the mouth of Connell Run which is at a point about 400 feet above Main Street bridge. For two miles up stream along the river bank above Main Street the land is occupied by the Baltimore and Ohio Railroad yards. The 30 inch sewer has an overflow pipe near the river bank, the main outlet being located farther out in the river. The overflow is to permit the sewage to discharge free at high water. The intercepter takes the sewage from the eastern part of the borough through the entire length of the run valley. The district is known as sewer district No. 3 and in it all four miles of sewers and of which 50 per cent. is eight inch pipe and 73 per cent. is 15 inch pipe or less. At places the sewer is built in the run. Reasonably high water covers the entire structure and there are known to be leaks into the sewer.

The next and last outlet, the 18 inch Trump Run intercepter, discharges into the river 2,200 feet above the Connell Run sewer. It serves district No. 4 in which there are two miles of sewers of which 30 per cent. is 8 inch pipe and 75 per cent. is 15 inch pipe or less. The balance of the sewers range in diameter from eighteen inches to twenty-two inches. The outlet under the tracks in the railroad yard, is in the form of an inverted syphon.

All along the river front in the town there are private sewers emptying into the stream in the borough.

There are six private sewer outlets discharging into Mounts Creek within the borough limits and there are a number of privies built over the stream.

The first of these private sewers is an eight inch pipe which serves one building. The next is an 18 inch surface drain taking sewage from several residences. The next is an eight inch sewer from a dwelling on Fourth Street and there is a smaller sewer in Highland Avenue. There is a large combined sewer serving the property of the Sligo Iron and Steel Company works and the Munson Heater Company. The outlet is 36 inches by sixty-six inches. The last sewer is 30 inches in diameter and belongs to the Pennsylvania Railroad and intercepts street drainage which during dry weather is waste water from dwellings to quite an extent. There is also a brewery connection.

Connell Run does not receive sewage from any public outlet, but there are overhanging privies along the banks. A system of private sewers on the Hogg estate comprising a total length of 3,300 feet of pipe whose diameters range from ten to fifteen inches empties into the run, near a manhole on the line of the borough sewer in the valley. It is reported that the owners have failed to obtain satisfactory arrangements whereby this outlet can be connected into the borough intercepter. Negotiations with this subject in view have been had. It is understood that the question is one of price.

Trump Run receives sewage from overhanging privies, from the brewery and several private drains, the latter in the Davidson and Newmyer Addition inside the borough limits. It is here that the public authorities desire to build sewers.

Outside of the old borough limits in the district known as the south side, now municipal territory, there are several private sewers which discharge into small runs and one of them discharges into the river at the foot of Gibson Avenue.

These several sewer outlets are all above the water works intake of the Baltimore & Ohio Railroad. The large stone culvert known as the Gibson Avenue sewer is 400 feet distant only from said intake. Here the water is pumped from the river and supplied to the works and yards and also to the employees in the shops. The company filters the drinking supply by pressure filters.

The former borough of New Haven has a system of sewers on the combined plan with outlets into the river.

On the peninsula in Connellsville formed by the river and Mounts Creek, in the extreme northwestern corner of the borough, there is a public dump where refuse and garbage from the borough is hauled and discharged either onto the ground or directly into the river. The land is subject to inundation at high water. It is reported that the accumulations of weeks are carried down stream during freshet periods.

Dunbar Creek entering the river on the west bank just above New Haven and Opposum Run which flows into the river from the same direction just below the borough, receives large quantities of mine pollution and markedly discolors the Youghiogheny River. Above Dunbar's Creek and the intake of the Baltimore and Ohio, which is in the vicinity, the river has a clear appearance.

There is a place a short distance below the Connellsville Water Company's intake, used as a swimming pool by the youth of the borough. There is also another pool on the east bank of the river in the lower part of the borough which is used for swimming purposes. It is below all of the sewer outlets of Connellsville, excepting Mounts Creek outlet and below some of the sewers in New Haven.

Two miles below Connellsville is the village of Broadford in Upper Tyrone township. Here the Trotter Water Company has a pumping station and supplies river water unfiltered to various coking operations in the vicinity.

The city of McKeesport, which is 41 miles below, derives its drinking water from the Youghiogheny River.

During the current year the dumping of garbage and refuse into the river at Connellsville was cause for complaint to the State Department of Health from citizens in McKeesport. Orders were issued to the various municipalties along the river and the practice has been temporarily stopped. There is an ordinance in Connellsville prohibiting the dumping of all offensive and obnoxious matter of any kind upon the banks or margin of the river or into the waters thereof.

Owing to the acidity of the Youghiogheny, it is only during freshets that much sewage pollution of a pathogenic character reaches the city of McKeesport. It is expected by persons who should know, that the coking operations will within several decades, have become less extensive in the Youghiogheny valley and in consequence the stream will be much less acid. So the sewage pollution, and hence menace to public health, will increase unless some plan be devised to obviate such increase. Under the laws of the State to preserve the purity of streams, it is clearly evident that Connellsville should anticipate the time when its sewage must be purified before being emptied into the Youghiogheny.

The local authorities should at this time study the situation, cause plans to be prepared for a comprehensive intercepting, sanitary system of sewers and sewage purification works. The latter need not be built now, but the plan as a whole should be devised and adopted, and then as the years go by, sewer extensions may be made in conformity therewith until finally when the interests of the public health shall demand it, the disposal works shall be built and all will fit into a perfect whole.

The town is so situated, that surface water can be conducted in street gutters to nearby natural water courses in many instances. It is not economical to try to convey surface water for long distances under ground when it could run off to some nearby surface channel.

The town authorities were notified of the decree relative to sewage issued by the Commissioner of Health in August, 1908. Attention was called to the desirability of prohibiting bathing in the river below the borough sewer outlets.

In the hill district of Connellsville are located the better class of residences and here the sanitary conditions were good. But on the flats in the old town and in New Haven district unsanitary conditions prevail. There are a large number of properties not connected with the sewers in New Haven. Here out of 51 cases of typhoid fever, 34 lived in houses having no connection to the sewer, on the property of which there were privy vaults and general kitchen drainage and laundry water were deposited on the surface of the ground in the back-yard. The other 17 had sewer connections. In old Connellsville out of 24 cases, 14 had sewer connections and 10 privy vaults only. A good many of the privy wells were full, some were overflowing. The local board of health did little but placard the cases, disinfectants were not furnished, the town did not employ men to go about, and clean up, the individual householder was expected to do these things and if he neglected to do so, nothing was done about

The outbreak occurred during the fly season and very largely in the unsanitary districts.

The local board of health were lax in their enforcement of health rules. A case came before the Department which finally resulted in a communication being sent by the Commissioner of Health over the head of the Health Officer, to the Board. A newspaper editorial on the case and the Commissioner's letter were as follows:

"The Daily Courier.

"Monday Evening, June 27, 1910.

"Lax Enforcement of the Health Rules.

"We fear the rules and regulations of the Board of Health of Connellsville are more honored in the breach than in the observance. It is time the members of the board were indulging in serious introspection.

"We are advised that some of the physicians who are members of the board are the most flagrant violators of the law requiring them to report promptly all cases of contagious and infectious diseases that come under their care. They should by reason of their position furnish a better example to other physicians.

"A child died Saturday evening in a Fourth Ward residence of malignant diphtheria. The Health Officer was notified to establish the usual quarantine. He reported that the child had died of a severe cold. Sympathetic neighbors and friends visited the house during Sunday afternoon freely. They took no precautions against contagion and nothing but rare good fortune will prevent them from unconsciously spreading the dread disease.

"The house should have been promptly placarded and visitors forbidden until such time as the danger of contagion is over. This is unfortunate for stricken people. It is hard for warm-hearted and big-souled friends to remain away during such times of sorrow and tribulation, but it is absolutely necessary for the safety of themselves and the community that they do so.

"All quarantine regulations are more or less harsh and unsympathetic, but they are essential to the protection of the living.

"The grief-stricken parents of the innocent victim declare that the evil condition of an outhouse on a neighboring lot close to their residence is responsible for the death of their darling babe, and that complaints concerning the character of his death breeding nuisance were duly but vainly made to the health authorities. The property is owned by an officer of the board.

"The rules and regulations of the Board of Health were designed to protect the people from disease and death. They should be strictly observed and above all those charged with their enforcement should be the last persons to violate them.

"We trust it will not be necessary for us to refer to this matter again, but if it is we will do so in no uncertain manner. If others fail in their public duty, we will endeavor to perform our own fidelity."

"Harrisburg, Pa., July 13, 1910.

"To the President, and Members of the Board of Health.

"Connellsville, Pa.

"Dear Sir:—We have complaints and petitions in this Department about a nuisance on the property of George B. Brown, consisting of an outhouse said to be maintained in a very insanitary condition, the abatement of this nuisance is neglected or refused by the borough board of Health for reasons unaccountable. We have replied to these complainants that the matter first comes under the jurisdiction of the local health authorities and that we are referring the complaints to them and requesting prompt attention to same and the abatement of the nuisance.

"Will you please be so good as to inform the Department of the particulars and give the reasons why this alleged nuisance should exist. We assure you the complaints have come from such sources that the matter can be no longer considered trivial.

"Yours very truly,

"SAMUEL G. DIXON,
"Commissioner of Health."

Connellsville was not the only place in the vicinity to suffer from typhoid fever during 1910. Scottdale was visited with an epidemic. More pronounced, however, than the presence of the disease in the boroughs, was that in the surrounding townships. The following table shows the cases reported to the Department from Connellsville township that surrounds the old town of Connellsville; Dunbar Township that surrounds the New Haven district; Bullskin Township through which Mounts Creek flows before passing into Connellsville; and Springfield Township to the south, and it appears that in these four townships for the months of July, August, September, October and November, nearly half of the total rural typhoid for Fayette County was recorded.

Typhoid Fever Cases Reported by Townships to State Department of Health.

1910.	Connellsville.	Townships.				Total of four townships.	Total rural for county.
		Connellsville.	Dunbar.	Bullskin.	Springfield.		
January,	0	0	0	0	0	0	13
February,	2	1	1	0	0	2	15
March,	0	1	3	1	0	5	15
April,	0	0	0	1	0	1	12
May,	0	0	0	6	0	6	9
June,	0	0	1	0	0	1	19
July,	4	6	1	1	1	9	22
August,	22	2	6	13	8	29	58
September,	22	10	4	5	12	31	75
October,	17	4	11	10	9	34	96
November,	13	2	17	0	5	24	42
December,	2	1	0	1	1	3	23
	82	27	44	38	36	145	399

The incidence of typhoid was peculiarly marked in Dunbar Township. It was less marked in Connellsville Township. The occurrence of the disease was simultaneous with the Connellsville outbreak and this is true for Bullskin Township. It may be that the citizens of the rural districts contracted the infection while in Connellsville. There were many ways by means of which the infection could have been spread. Of the 36 cases reported for Springfield Township, 18 were above the Indian Creek reservoir of the Mountain Water Supply Company and 18 were on the watershed of the creek below this reservoir. Some of the latter were believed to have originated from a lumber camp.

Conclusions.

The Department was not on the ground early enough to make the diagnosis necessary to have determined with fair probability what the sources of infection and the mediums of transmission of the infection actually were. That the disease was not water borne in all probability is fairly well proven by the facts hereinbefore set forth.

39. TYPHOID FEVER AT FALLS CREEK.

On October 27th, 1910, Dr. Jas. B. Neal, of Reynoldsville, notified the Commissioner of Health that he was treating a case of typhoid fever at John Rayback's in Washington township, Jefferson county; also that another case existed on the Wilson farm in the same township and was being cared for by Dr. Booher of Falls Creek. The reason given for reporting these cases was the fact that they were on the watershed of Kyle Run which furnishes a part of the water supply of Falls Creek borough.

Assistant Engineer Ralph E. Irwin, under instructions visited Falls Creek on November 1st and investigated the conditions and supervised the treating of the public water supply with chemical germicides.

The Commissioner of Health sent a telegram and followed it by a letter of instructions to the Burgess and Board of Health of Falls Creek borough. They were as follows:

"October 31st, 1910.

"Burgess and Board of Health, Falls Creek borough,
Jefferson Co., Pa.

"There is typhoid fever on the watershed supplying your borough with water. Order the public to boil all water. Letter is following.

SAMUEL G. DIXON,
Commissioner of Health."

"October 31st, 1910.

"Burgess & Board of Health,
Falls Creek borough,
Jefferson County, Pa.

"Gentlemen: We are in possession of information that there is a case of typhoid fever at John Raybacks in Washington township, Jefferson county, on the head waters of Kyle Run on which stream the B. R. & P. Railroad is building a dam from which some water is to be supplied in Falls Creek. Futhermore, there is a case of typhoid fever on the Crawford farm and at present there is a case on the Wilson farm, all three on the watershed supplying your municipal water works system. We are sending to your town Mr. Irwin who will visit these places and see that all things are done to kill the poison on the property and prevent any further contamination of your water supply. Meantime your should notify the public to boil the water. Mr. Irwin will advise you what further precautions are necessary to sterilize the water in your reservoirs. We will issue a decree this week relative to your water works system.

Yours truly,
SAMUEL G. DIXON."

The following is a report of the general situation:

The borough of Falls Creek, Jefferson county, is a railroad and industrial community with a population in 1900 of about 1,000 persons and a present population of about 1,300. The municipal area comprises about 2 1-4 square miles and the houses are rather widely scattered. The borough is situated at the extreme eastern boundary of Jefferson county on the west side of Wolf Creek near its junction with Sandy Lick Creek, the latter being a principal tributary of Sandy Lick Creek, Falls Creek, the stream from which the borough derives its name, flows easterly along a portion of the northern boundary entering Wolf Creek at the extreme northeastern corner of the borough. The Clearfield County line forming the eastern boundary of the borough, passes just west of Wolf Creek for most of this distance.

A small portion of the northern part of the borough drains towards Falls Creek, the greater part of the settled territory sloping irregularly in a southeasterly direction to Sandy Lick Creek. A small run flowing southeasterly into the creek receives much of this drainage. There is a difference of elevation between the highest and lowest portions of the borough of about 130 feet.

The borough of DuBois, Clearfield county, with a population of about 13,000 is situated about 2 miles up Sandy Lick Creek in a southeasterly direction from Falls Creek borough. They are closely connected by trolley and railroad and many interests of both places are the same.

The main line of the Buffalo, Rochester and Pittsburgh Railway extends north and south paralleling Falls Creek borough line and through DuBois, and the low grade division of the Pennsylvania Railroad follows the north bank of Sandy Lick Creek through the lower portion of the borough extending in a general easterly and westerly direction. A branch of the Buffalo, Rochester and Pittsburg Railway extends along the south bank of Sandy Lick Creek southwesterly to Reynoldsville. It is reported that the Franklin and Clearfield

Branch of the Lake Shore and Michigan Southern Railroad, now under construction, will extend through Falls Creek borough. The borough is therefore an important junction point and railroad centre with prospects of increased importance in this respect.

The commercial interests of Falls Creek borough centre around the tanning and glass industries. Adjoining and northeast of the borough is a large tanning plant of the Elk Tanning Company. The Crystal Window Glass Manufacturing Company has a plant within the borough which gave employment to 450 persons but has been inactive for the past five years. Extensive repairs are now in process and it is reported that the plant will again soon be in operation. The Gray and Son Company manufacturing skylight glass give employment to about 20 persons. In the northern part of the borough the Crystal Window Glass Company have in operation a sand crushing plant with about 25 employes. Glass sand rock is here quarried and crushed on a small scale for commercial purposes. Just south of the borough line there is an extensive brick plant operated by the DuBois and Butler Brick Company. Many of the employes of these establishments reside in DuBois.

The sewerage facilities of Falls Creek borough are very limited, consisting of a 12 inch sewer in First Street, 2,000 feet long, having 10 properties connected thereto with a branch sewer 1,000 feet long with 9 additional connections. This sewer is used for sanitary sewage only, so it is reported, and was built by and is the property of the Falls Creek Sewer Company, an association of private interests formed for the purpose of the construction of this particular sewer. The outlet of this sewer is in the southern part of the borough on low ground extending to a point near the Pennsylvania Railroad tracks, from where a small amount of sewage passes through a culvert to Sandy Lick Creek. This sewer serves the principal business portion of the borough. There are two private cesspools in the borough. The remainder and far the greater portion of the properties have privies which are cleaned every year under strict rules of the local board of health.

The assessed valuation of property within the borough is reported to be $277,000.00 and the bonded indebtedness $16,000.00. The recent sale of water rights to the Buffalo, Rochester and Pittsburgh Railway Company created a fund of $12,000.00 which is available for improvements to the water works system.

Public Water Works System.

The public water works system is owned by the municipality and serves about half the population, the other half being dependent upon private wells. The water works system comprises a very low dam on Falls Creek just within the western borough limits, a suction pipe, pumping station, force main, distributing reservoir and distributing system. The pumping station is a frame structure on the bank of the stream at the west end of Ridge Avenue. It is not in good repair and in it are two pumps, a Downey deep well pump with four inch supply and five inch discharge pipes operated by a 25 horse power gasoline engine and an Epping-Carpenter 7 1-2 inch by 4 1-2 inch by 10 inch force pump with four inch supply and three inch discharge. This is a steam pump operated by a 20 horse power upright boiler. The capacity of the deep well pump is said to be 3,500 gallons an hour and of the force pump 2,500 gallons an hour. Beneath the deep well pump is a suction well 8 feet in diameter and 14 feet deep with a loose stone lining. The well extends a short distance into rock. Water was formerly delivered to this well and to the force pump through an eight inch pipe extending a few feet to and into the shallow pool formed by the low crib dam. At the end of this intake pipe there was an elbow and short length of pipe pointing down stream. In the fall of 1909, owing to the presence of typhoid fever at a farm house a short distance above the intake this pipe was stopped with a wooden plug driven in the end and a new line four and one-half inches in diameter was laid for a distance of 1,130 feet to a new temporary earth and log crib dam. The end of this pipe if turned up and provided with a perforated cap.

The three inch and five inch discharge pipes from the pumps extend easterly about 30 feet where they unite and a single force main five inch in diameter increasing to six inches extends for a distance of about 1200 feet easterly along the line of Ridge Avenue to the distributing reservoir into which it discharges at the top. The pumps are operated under a head of approximately 150 feet.

The distributing reservoir is a tank of 30 feet in diameter and about 24 feet in height with a capacity of 125,000 gallons. From the bottom of this reservoir a 12 inch main extends to the corner of Third and Ridge Streets with the distributing mains at Fourth and Third streets. The distributing system comprises approximately 1,000 feet of 12 inch pipe, 2950 of eight inch, 7300 feet of six inch and 4250 feet of four inch pipe, all of cast iron, a total of about 3 miles of mains. Of these mains 2250 feet of six inch and 1650 feet of four inch pipe have been laid since April 22nd, 1905, and no permit has been issued therefor.

The watershed of Falls Creek above the intake comprises about 13 square miles, mainly of farm land. Recently the borough sold to the Buffalo, Rochester and Pittsburg Railway Company its rights to Kyle Run, a tributary of Falls Creek and the railroad company has now under construction a storage reservoir one mile above the junction of Kyle Run with Falls Creek. This water to be piped to the railroad shops and tanks in the vicinity of Falls Creek and DuBois. The watershed above the railroad company's Kyle Run dam is about six square miles. It is reported that an agreement has been reached whereby a portion of the water stored in the Kyle Run reservoir will be allowed to pass down the stream in times of extreme drought to augment the supply available for use in the borough.

The Department during the current year made an inspection of all properties on the Falls Creek watershed, the results of which show that there are 120 occupied estates with a population of 516 persons besides 152 horses, 356 cattle and 182 pigs. Seven of these properties were found to be contaminating the stream and the pollutions were abated. Of the above properties the occupants of the Kyle Run watershed belong 24 estates upon which there are 120 persons, 39 horses, 109 cattle and 42 pigs.

The total estimated daily consumption is 20,000 gallons of which 14,000 gallons are used for domestic and 6,000. for industrial purposes. A measurement taken in 1909 during the dry period gave a minimum flow of 30,000 gallons in 24 hours in the main branch above the mouth of Kyle Run so it is reported.

The recent sale to the Buffalo, Rochester and Pittsburgh Railroad Company of the water rights on Kyle Run reduces the available watershed area from 13 square miles to seven square miles except that in emergencies some water from Kyle Run may be used. About two-fifths of the available supply of water has thus been disposed of. In order to make up the shortage, the borough purposes to construct a new storage reservoir on Falls Creek and a new supply main, pumping station and force main.

Proposed Water Works Improvements.

The borough on July 25 made application for permission to make these improvements and extensions. The site of the proposed reservoir is at a point on Falls Creek 600 feet west of the northwest corner of the borough. The proposed dam will be about 475 feet long and 14 feet in height. It will be of earth construction with concrete core wall and a 50 foot concrete spillway with wing walls 70 feet in length. The dam will impound water to a depth of 12 feet, flooding an area of about 6 acres and forming a reservoir with a capacity of about 10,000,000 gallons. The core wall will be six feet thick at the base extending 2 feet into rock, 4 feet thick at the top and 13 feet in total height. A 24 inch cast iron blow-off pipe is provided at one side of the spillway. The bottom of the reservoir is to be stripped of organic matter before it is put in service.

From the reservoir an eight inch cast iron supply main will extend in a straight line 2740 feet to a point within the borough at the intersection of Falls Creek and Taylor Avenue, where the proposed pumping station will be erected. The details of the pumping station and the equipment have not yet been determined but it is the intention to install at least one pump with a capacity not less than 100,000 gallons daily.

From the pumping station a force main of eight inches in diameter for 1710 feet and 12 inches in diameter for 450 feet will connect with the existing distribution system at Fourth Street and Ridge Avenue. The water will be pumped into the system, the surplus backing up through an existing 12 inch main into the bottom of the present tank which will thus act as an equalizing reservoir.

It is also proposed to extend the distribution system by the construction of 1500 feet of 6 inch and 2600 feet of four inch pipe in Madison and Fuller Avenues and in Third Street, McConnell Street and First Street. It is also proposed to extend the six inch mains in Taylor Avenue and Main Street to their point of intersection just outside of the borough in Sandy township, Clearfield county. The construction of this portion of the system depends on the success of a projected movement to annex this territory to the borough.

It is also intended, at the point where the six inch main in First Street intersects the borough line, to supply water to a projected system for the Falls Creek tannery of the Elk Tanning Company and the houses in its vicinity in Sandy township, Clearfield county. This territory also may eventually be taken into the borough so it is reported.

The greater portion of the watershed area tributary to the proposed storage reservoir in Falls Creek is farm land in a high degree of cultivation, which a portion of it is woodlands chiefly along portions of the creek. Under normal conditions the watershed will comprise seven square miles with a population of 57 per square mile. The Kyle Run watershed which is available in emergencies comprises six square miles with a population of 20 per square mile, making an average population on the drainage area of 40 per square mile. The occupied estates on Falls Creek are for the most part scattered with the exception of a small group of houses called Rockdale Mills, which is near the creek and about two and one-half miles above the dam site. A number of the farm dwellings are in close proximity to the stream or its tributaries. In view of the extensive settlement of the territory it would not be surprising to find a considerable pollution of the creek water. Analysis of samples taken by the Department on August 15, 1910, show this to be the case. The results of these analysis were as follows:

	Bacteria Per C. C.	
	Total.	B. Coli.
No. 1, Falls Creek, 1,100 feet above intake pipe,	300	0
No. 2, Falls Creek, near Rockdale village,	100	20
No. 3, Kyle Run, above intersection with Falls creek,	1,500	33
No. 4, Tap in Falls Creek borough,	100	3
No. 5, Tap in Falls Creek borough,	300	4

In 1902 one case of typhoid fever occurred on the Falls Creek watershed and in 1903 four cases. In 1908 there was a case of typhoid fever on the Kyle Run watershed. In 1909, as already noted, typhoid fever existed just above the intake of the water works and to avoid contamination of the supply from this source, a new in-take was constructed at a point further up stream.

A single case of typhoid fever on the watershed of the public water supply may readily result in dangerous illness to a large portion of the community using this water and be the cause of many deaths. This fact was learned at terrible cost at Plymouth, Butler, Nanticoke and other places where well known epidemics have occurred. At Nanticoke a portion of the community receiving the public supply was free from the disease. Investigation showed that the water delivered to this district had the benefit of sedimentation in a reservoir which proved a sufficient barrier to prevent the transmission of the disease. A number of cases of typhoid fever which have occurred in Falls Creek borough in the past few years were in portions of the town not supplied with public water and were attributed to the use of polluted wells and springs. There are also a number of cases which may have been due to the infection of the public water. The utmost vigilance is necessary to reduce the danger of such infection.

In a decree issued to the borough of Falls Creek on October 31st, 1910, the following discussion was set forth:

It is not apparent to the Department from what source the municipality is to obtain the money necessary to defray the cost of the dam and its appurtenances and the new pumping station machinery and additional water pipe lines. If the facts have been correctly reported to the Department, it is conclusive that the municipality does not have funds to do all of this work and to erect a water filter plant. Nevertheless, it has been hereinbefore shown that the water is not safe to drink in its raw state. There should be a treatment plant erected. While the impounding reservoir proposed would, under normal conditions, afford somewhat of a barrier to the transmission of water borne diseases, at the same time it would not be a barrier sufficient to garrison an invasion of an epidemic. The Department would not permit a private corporation to obtain the proposed source from Falls Creek except in connection with a water filter plant, and, therefore, the Department should not discriminate in favor of a municipal corporation since the public would suffer equally in the event of an outbreak of a waterborne disease. The risk to public health proposed by the municipality is hazardous and one which the Commonwealth is not willing to bear with the local authorities. It is possible that the town can enter into contract with some filter company whereby the latter will contract to erect a water filter plant and receive payment therefor by yearly installments on a basis that will bring the cost of this plant within the financial ability of the town to assume.

In view of all the circumstances, the Commissioner of Health approved the proposed extensions and additions on August 31st, 1910, subject to the following conditions and stipulations:

FIRST: That before the borough constructs the proposed additions and improvements to its waterworks system, it shall prepare and submit to the Commissioner of Health for approval, detail plans and specifications for the treatment and purification of the water supplied by it to the public and these plans will be approved, modified or amended.

SECOND: The borough shall not build or extend its waterworks system until it can prove to the satisfaction of the State Department of Health that it is financially able to build complete and put in operation the proposed impounding reservoir, pumping station, pipe lines and the water purification plant herein stipulated.

THIRD: The borough shall cause to be made a monthly sanitary patrol of the watershed of Falls Creek in its entirety above the proposed municipal waterworks intake, including that of Kyle Run and all tributaries, and reports of the conditions at all occupied estates shall be submitted each month to the State Department of Health, including a list of all cases of contagious and infectious disease on the watershed.

FOURTH: The borough authorities may from time to time, as occasion may require, extend the mains of the distributing system within the borough territory, but at the close of each season's work plans shall be filed in the Department of Health showing all extensions made during the year, together with any information relative thereto which may be required to the end that the Commissioner of Health may at all times be informed of the extent and use of the system.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the water works system or any part thereof shall be found prejudical to the interests of the public health, then such remedial measures shall be forthwith adopted as the Commissioner of Health may prescribe or approve.

SIXTH: Records of the operation of the water works system shall be kept on blank forms satisfactory to the Commissioner of Health and shall be filed in the Department when requested.

Typhoid Fever at Falls Creek.

In the following table is given by months the cases of typhoid fever reported by the local authorities to the State Department of Health for Falls Creek borough and the townships of Sandy and Washington:

Falls Creek Borough and Vicinity—Typhoid Fever Cases Reported to State Department of Health.

	Borough.		1910.		
	1909.	1910.	Sandy township.	Washington township.	Total for 1910.
January,	0	0	0	0	0
February,	0	0	0	0	0
March,	0	0	0	0	0
April,	0	0	0	0	0
May,	0	0	0	0	0
June,	0	0	0	0	0
July,	0	0	0	0	0
August,	1	0	3	0	3
September,	4	1	3	3	7
October,	0	1	6	0	7
November,	0	6	1	0	7
December,	0	0	0	0	0
Total,	5	8	13	3	24

Prior to 1909 the Secretary did not keep records. His books show that there were 9 cases in the borough for 1909, and 10 cases for 1910 up to October 27th. For some reason, however, but five cases were reported to the State for 1909 and eight cases for 1910. In Washington township and Sandy township which surrounds Falls Creek borough there were respectively one case and 13 cases for the entire year 1910, reported at Harrisburg. Mr. Irwin found two other cases in Washington township. Those occurring in Sandy township were mostly located in the settlement adjacent to Falls Creek and may be considered connected possibly.

At DuBois borough but one case was reported for the year and that was in January. Only one of the 3 cases appearing in the table for Washington township was reported to the Department. It would appear that there were 24 cases from August to November inclusive, for the district under discussion, 16 being in the two townships.

There were for the entire county of Jefferson during this four month period in the borough 61 cases, of which 47 were in the boroughs of Brookville and Punxsutawney, 28 being in the former and 19 in the latter. Naturally the rural typhoid fever might be expected to have increased about these two boroughs. It did not, however, according to reports for the suburbs, for there were no cases reported from the suburbs of Punxsutawney but there were 19 in the townships surrounding Brookville, out of a total of 77 rural typhoid fever cases for the county for these four months. In other words 47 out of a total of 138 cases in the entire county from August to November inclusive occurred in Brookville and vicinity, thus showing this district to have been a possible focus of infection for other parts of the county. Its 47 cases and the 24 cases in the Falls Creek district made these the two principal danger spots for that region.

MR. IRWIN'S REPORT. "The two reported cases of fever on Kyle Run were visited. The case at the home of John Rayback was that of Lattie Rayback, a school boy who had previously attended the Ray school in Washington township. The date of onset was given as September 23rd and the first visit of Dr. J. B. Neal was October 1st. About October 6th, Dr. H. B. King, Health Officer, for that district called and placarded the house but left no circular. The water supply on the premises was obtained from the spring but the patient had obtained water from numerous sources. The patient was cared for by members of the family and typhoid dejecta were disinfected with lime and buried.

"There were two other cases in the neighborhood having dates of onset about September 23rd. One of the cases was that of Jessie Rayback not located on the Falls Creek shed. This patient was 14 years of age and had obtained water from various places. Both patients had attended the Brookville Fair which was in session from September 14th to 17th inclusive. It was thought by the parents of these two that the fever was contracted while attending the fair."

At the conclusion of the year the records in the Department for the Brookville district were tabulated by the Chief Engineer and they are given in the following table. It will appear from this table that typhoid fever was prevalent in Brookville before the date of the County Fair.

Typhoid Fever Cases Reported to State Department of Health for Brookville District.

	Brookville.	Surrounding Townships.			Total for townships.	Total for district.
		Pine Creek.	Knox.	Rose.		
January,	0	0	0	0	0	0
February,	11	1	0	0	1	12
March,	7	0	1	0	1	8
April,	8	0	0	0	0	8
May,	0	0	0	0	0	0
June,	0	0	0	1	1	1
July,	1	2	0	0	2	3
August,	6	5	0	5	10	16
September,	12	2	1	2	5	17
October,	6	0	0	0	0	6
November,	4	0	4	0	4	8
December,	3	0	0	0	0	3
	58	10	6	8	24	82

Continuing with Mr. Irwin's report he wrote as follows:

"The third case was that of Lawrence Wilson a school boy seven years of age attending the Ray School in Washington township. Water was secured from a well and spring at home and also from other places about the neighborhood. The house in which the patient resided was not placarded and no circular had been left. Disinfectants were used about the premises and all seemed in a sanitary condition. The two premises located on Falls Creek watershed on which typhoid fever was located were in good condition having recently been inspected by Department officers and abatement notices had been complied with. In both cases the properties were located close to the stream and there was a possibility of infected water reaching the stream under ordinary circumstances.

"On Kyle Run about one mile above the borough of Falls Creek the Buffalo, Rochester and Pittsburgh Railroad was constructing a storage reservoir. This water is to be piped to the railroad shops and tanks in the vicinity of Falls Creek and DuBois. Many workmen were employed and although the sanitary conditions where the dam was being constructed were of a seemingly good character there was however, a possibility of Kyle Run being infected. It was said that this construction would be carried far into the winter and probably would not be completed until late in the following spring. The water coming from Kyle Run was being stored in the dam during the process of construction so that at the time of inspection water was entering Falls Creek from Kyle Run. It was expected, however, that as soon as the rainy season began the water would overflow the dam and enter Falls Creek.

"Because of the fear that the supply would be contaminated by fever existing on Kyle Run watershed or from the construction camp where the railroad dam was being built the borough officials were planning to lay a temporary inlet line up Falls Creek past the junction of Kyle Run and Falls Creek.

"After inspecting the watershed on Kyle Run and the construction camp I recommended to the local Board of Health that the water supply be treated chemically and this was approved from Harrisburg. After considering this recommendation the Water Committee of Council prepared for the treatment of the public supply by the use of copper sulphate. This treatment was to be continued until the imminent danger of infection existing on the water shed ceased or until a filter plant was installed. The writer gave detailed direction to Drs. McCormick and Booher, active members of the Board of Health, regarding the use of copper sulphate as a sterilizing agent and the manner in which it should be applied. The Doctors in turn, in company with the writer, instructed the operator at the pumping station regarding the use of the sterilizing agent. It was advised in the case to use one part per million copper sulphate while the water was clear and to increase with increased turbidity until two parts per million was reached. As the water at the pumping station was obtained from an intake well and pumped to a distributing tank holding several days supply the use of the chemical was exceedingly simple.

"Dr. McCormick was furnished with a water sampling outfit containing six sample bottles with which to make collections from different points in the water system to show the effect of the disinfectant. The following is a result of the analysis:

	Bacteria Per C. C.	
	Total.	B. Coli.
No. 1. End of central main line, Main St. Res. of J. B. Horter,	6	0
No. 2. End of Church St., Main St. Res. of I. E. Smith,	8	0
No. 3. End of Taylor Ave., Main P. J. Corey Hotel,	12	0
No. 4. End of 1st Main, Ridge Ave. Res. J. A. Giddings,	20	0
No. 5. Water trough springs, Crawford editor,	1	0
No. 6. Main line, Deemer block,	6	0

"The watershed supplying Falls Creek covers the greater part of Washington township. This district is fairly well inhabited and the physicians practicing in the district are located principally at Falls Creek so it is said. The Board of Health and the Water Committee of Council are active and desire to keep the health of the people in excellent condition and to furnish them with a fair water supply. They are as a whole in favor of a filtration plant and the decree issued by the Department requesting the erection of the filtration plant was gladly received."

The work of the Department at Falls Creek was of a preventative order rather than one of suppression. As the years go by and preventative measures become more extensive, the striking benefits therefrom will grow less and less until there may be some citizens who will raise the question of whether these preventative measures are necessary. The wonderful accomplishments of expelling from the country of smallpox is almost forgotten by older persons and yet there are living citizens who can remember when hardly a city, borough, village or hamlet was free from this pestilential disease that reaped its harvest of mortality. In Falls Creek it cannot be ascertained with positiveness that there would have been an epidemic of typhoid fever of a water borne character had not the Department take the precautions hereinbefore described.

40. TYPHOID FEVER IN CUMBERLAND AND JEFFERSON TOWNSHIPS, GREENE COUNTY.

On October 31st, 1910, the Reverend John W. King of Carmichaels borough, Green County, Pennsylvania, wrote to the Commissioner of Health with respect to a conversation he had just concluded with a Dr. E. W. Laidley, in regard to typhoid fever cases that had existed during the summer in the little village of Khedive, Cumberland Township. This hamlet is about 2 miles out in the country beyond Carmichaels borough. Carmichaels Borough is a substantial, residential community, located in the eastern part of the county, 12 miles from Waynesburg, the county seat of government. The population is 478. The municipal area is bounded on all sides by Cumberland township. The borough is without either railroad or trolley facilities. The method of transportation is by stage coach. The nearest railroad station is Rice's Landing on the Pennsylvania Railroad northward a distance of four miles on the Monongahela River.

The borough lies within a rich agricultural district underlaid by the bituminous coal measures. With the exception of a planing mill and grist mill, the town is without industrial enterprises. The inhabitants are mostly retired farmers and a few wealthy farmers carrying on business outside of the town. The drainage facilities are excellent, the grounds sloping towards Muddy Creek and Glade Run. Carmichaels is without a public water supply. All the inhabitants obtain their water from dug or drilled wells and cisterns, there being 56 dug wells, six drilled wells and 35 cisterns now in use. There is no public sewer system, and but one private sewer. The general method of sewage disposal is into privy vaults, of which there are 85. There are also six cesspools in the town. In many instances kitchen waste and wash water are thrown on to the surface of the ground or into street gutters. There are six houses attached to the private sewer line which empties into Muddy Creek. During the last five years 3 cases of typhoid fever only have been reported as occurring in the borough. For 1910 there was only one case so far as the Department has ascertained.

In August of the current season, the property owners asked for approval of plans for a modern sewerage system and disposal works for the built-up portion of the community. The plan was to build sanitary sewers and to discharge the sewage, untreated, temporarily, into Muddy Creek. While the privy vaults in use are of good design, affording protection from the flies and insect menaces, the disposal of wash water and slops on the ground causes some annoyance and the resourceful property owners desire modern plumbing facilities and a free outlet for their sewage. It was stated that all of the dwellings in the borough, numbering about 100, would probably be connected to the sewer system.

The assessed valuation of the borough is reported to be one hundred and eighty-three thousand six hundred and five dollars with no bonded indebtedness. If this statement be correct, the borough can borrow twelve thousand eight hundred and fifty-two dollars and thiry-five cents before the limit as required by law is exceeded.

This amount of money is insufficient to build the sewer system and the sewage disposal works. Even if the cost of the sewers were entirely assessed on abutting properties, twelve thousand dollars would not be a sufficient sum to build sewage disposal works ample in size to take care of all of the flow of sewage which would likely to be yielded from the sewer system. Furthermore, it would not be possible to operate the proposed sewer system without an ample supply of water. In modern sanitary sewer system, the vehicle of removal of the wastes of the household is water and it is not water which comes down from the clouds in the form of rainfall upon the roofs and the yards and the streets of the village and finally collected in the drains. This storm water is excluded from the sewer system. It requires a constant flow, independent of weather conditions to remove the wastes from the household and hence in the modern sanitary system the water used in the dwellings by members of the household after it has become fouled by said use is then put to the added use of being the vehicle for the removal of the solid waste matters of that household. Thus there must be a considerable volume of water used in each building to remove wastes from that building. Furthermore, it often is necessary to obtain a greater volume of water than comes from the household to flush the sewers and this is either done by the erection of flush tanks at the summit ends of sewers which are operated by water furnished from the public water works system or by water drawn from a hydrant of the water works system and discharged into the sewer through a hose attachment.

At present, as already been mentioned there is no water works system in existence in Carmichaels. The citizens use water sparingly because of the lack of facilities to promote an abundant use of water in the house. It would not be possible by the present system of water supply to operate the proposed sewer system. To the contrary, the disposal of sewage in these sewers would likely be more insanitary than the present methods of disposal if properly improved.

It is a well recognized fact by sanitarians that it is extremely dangerous to draw water from the ground in proximity to cesspools and privy vaults when such water is used for drinking and domestic purposes. It will appear in the interests of public health that Carmichaels needs first a system of public water works, both in town and to afford fire protection; and secondly, as an antecedent to the establishment of a modern system of sewerage and sewage disposal works.

Muddy Creek is now a comparatively pure stream of water. It is an available supply which as years go by and the country roundabout develops will prove a very valuable asset. It is essential that the purity of this stream shall be preserved to protect the public health and to conserve a natural resource. Even if Carmichaels should obtain its source of supply from a driven well this would not change the aspect of the situation.

If the situation in Carmichaels borough were different, if there were a public system now polluting Muddy Creek and it was the purpose of the borough to plan to treat all of the sewage in the near future, it might be in the interest of public health to temporarily permit a small amount of additional waste to go into the stream. But under the circumstances obtaining there it has not been shown why public health will be aided by approving the plans and permitting the construction of the sewers as proposed. The sewer system as now designed in itself might be approved. Nevertheless, it is not advisable for the borough to proceed with the construction of the sewer system. and it would not conserve the interests of public health to permit the sewers to be built and the sewage to be discharged into Muddy Creek.

In view of these circumstances, at the close of the year the Commissioner of Health issued a decree to Carmichaels borough, declining to approve of the construction of the sewer system and urging the local authorities to take up the consideration of a public water system.

These remarks have a peculiar reference to the insanitary conditions in the hamlet of Khedive and in the township of Cumberland surrounding the borough, for in this township typhoid fever is prevalent, in fact endemic during every summer season when flies swarm about the properties, while in the borough, where more careful methods obtain in the collection and disposal of excrement, there is an absence of typhoid fever. The population in Cumberland township is 1,524, in the borough 478.

Reverend Mr. King complained that in Khedive and also in a little village beyond Khedive, typhoid fever occurs annually during the summer. These places have the unenviable reputation of being typhoid fever districts. He requested, therefore, that the Commissioner of Health cause an investigation to be made to prevent future outbreaks of the disease in the district.

Assistant Engineer Irwin was detailed to make the investigation. He visited the typhoid fever locality on November 3rd and 4th. He reported as follows:

Mr. Irvin's Report.

"The fever was found to be located principally in a small farming settlement called Khedive. This settlement consists of 12 dwellings, two stores and a blacksmith shop. In this small community of 75 individuals, there were, this summer eight cases of typhoid fever located in seven of the families. The cases were of a rather severe type and among persons of mature age. The dates of onset ranged from July 20th to October 9th. In this manner typhoid has existed for a number of years. Information regarding the last three years showed that during the last three summers fever broke out in July and continued until cold weather. During this time almost every house has had fever cases each year.

"Several deaths have occurred. The water supplied to these different patients was analyzed and some showed surface pollution. It was thought that the water was the cause of very little, if any of the cases. The direct cause lies in the method of the construction of the privy at each of these places. All privies in the community were without vaults and open on the surface ground. This allowed the infection to be carried about the neighborhood by flies. More favorable opportunity for fly infection is hard to imagine. The probable medium of dissemination of the fever in this community was explained to the householder where fever had existed.

"The drainage from this hamlet enters Muddy Creek below Carmichaels. The dwellings at Khedive are on gently rolling ground so the drainage is in no instance directly to the stream. However, the method used to dispose of general household wastes is such that stream pollution occurs during heavy rains and the melting of ice and snow.

"Two other small Cumberland township communities, Ceylon and Paisley, have had similar typhoid histories. Also Jefferson township joining Cumberland township is similarly effected each year at the point where it joins Cumberland township at Khedive, so I was told.

"It seems established that typhoid fever is epidemic in Cumberland Township. Only the strict enforcement of sanitary regulations respecting waste disposal will free the district from the disease.

"In view of the foregoing conditions, I recommend that a sanitary inspector be sent to Cumberland and Jefferson townships to conduct a thorough investigations of all properties regarding the probabilities of typhoid infection by flies and water pollution, as a basis for correcting insanitary conditions. Those owners having water supplies showing sewage pollution should be notified to disinfect and protect the wells or abandon them."

Number of Cases of Typhoid Fever.

Mr. Irwin investigated two cases in Ceylon and eight cases in Khedive, one of the Khedive cases being located in Jefferson township on the opposite side of Muddy Creek from Khedive. He did not hunt up other cases in the two townships. Cold weather had arrived and there were no new cases being reported. By taking the names of patients reported from the two townships, at Harrisburg, and the names of the patients gathered by the Department's field inspectors, plus the names secured by Mr. Irwin, we have, for the townships of Cumberland and Jefferson, prepared the following table:

Typhoid Fever in the Rural Territory Near Carmichaels for 1910.

Month.	Townships.		Totals.
	Cumberland.	Jefferson.	
January,	0	0	0
February,	0	1	1
March,	2	0	2
April,	0	2	2
May,	0	1	1
June,	0	0	0
July,	5	1	6
August,	1	1	2
September,	7	5	12
October,	8	2	10
November,	3	0	3
December,	0	0	0
	26	13	39
In summer no date,	4	0	4
	30	13	43

Twelve private wells in Khedive and vicinity were sampled and the water analyzed and six out of these twelve samples showed sewage pollution. There had been typhoid fever at all these places. In the following table will be found the analyses:

Water Analyses in Cumberland Township.

Date.	Sample.	Bacteria Per C. C.	
		Total.	B. Coli.
1910.			
Nov. 6	Well, J. F. Areford,	2,400	4
6	Well, W. C. Groom,	720	0
6	Well, Frank Morris,	240	24
6	Well, Roy Dugan,	5,400	14
6	Well, W. C. Groom (Jefferson township),	100	0
6	Well, Joe Rockwell,	1,300	8
6	Well, Lewis Cayard,	1,500	600
6	Well, J. A. Areford,	160	0
6	Well, Wm. Roberts,	16	0
6	Well, G. Mundell,	7,200	40
6	Well, Frank Houston,	560	0
6	Well, Geo. Calbert,	6,500	0

These results showed sewage contamination of six of the wells. Regardless of the tests, wherever the wells were so located that surface drainage was liable to enter, the situation was extremely dangerous, especially when typhoid fever was prevalent. The interpretation of the results was sent Dr. Laidley and the Rev. Mr. King with instructions.

Conclusions.

Before another hot season the Department will have the unsanitary conditions in the typhoid fever districts surrounding Carmichaels borough thoroughly removed and permanently abated. The absence of typhoid fever in the borough where privy vaults are universally used, and the prevalence of typhoid fever in the rural districts surrounding the borough where privy vaults are absent, the excrement being exposed to flies and insects in the townships, while excluded from the flies and insects in the borough, is a commentary on the fatal consequences to neglect of sanitary precautions. The danger from fly transmission of infection is not the only one in the rural district. It is strange but true that in many cases privy drainage in times of rain is carried over the surface of the ground, or under it, to the nearby well or spring used for domestic purposes by the householders or even the neighborhood. A reduction of typhoid fever in the country, its banishment from the rural districts, must be a slow accomplishment because of the great amount of territory to be covered and work to be done to bring about at each individual farmstead and occupied property, proper care with respect to protection of the well or spring, and proper disposal of the wastes of the occupants.

41. TYPHOID FEVER AT QUARRYVILLE.

On October 6th, from Quarryville to the Commissioner of Health, came an anonymous letter stating that there were three cases of typhoid fever in the Borough, and that the local Board of Health was inactive, and that the indisinfected excreta from the typhoid patients was going into the stream from which the town was drawing its water supply. The Commissioner at once communicated with his agent in the borough and was informed that the stream was being polluted with typhoid sewage but it did not appear that the water was used for drinking purposes in Quarryville. The last of the month ten cases of typhoid fever were reported as existing and that the cause might be from the milk or from the pollution of the open creek, and thence the drinking water. Whereupon the matter was placed in the hands of the Chief Engineer for investigation. Inspector Max H. Matthes was sent at once to Quarryville to collect samples of the public water supply and Assistant Engineer Ennis was detailed to investigate the water works system at the typhoid outbreak. The following is a report of the conditions and what was done:—

Correspondence.

On March 2nd, the Secretary of the Local Board of Health sent in a report that Chemist Goodell had analyzed the water of the Springs at the Pumping Station on the water works system and found the water to be polluted. The Commissioner of Health at once ordered the Secretary on his own conviction, that the public water supply was polluted, to notify and warn the people of the town to boil the water. On November 3rd, the following notice was posted around the town.

"The analysis of the Water supply of the Borough has been made and it is found to be impregnated with Bacilli Coli or Sewage Bacteria. It is dangerous to use this water for drinking purposes without BOILING IT, AT LEAST 10 OR 15 MINUTES. Be very careful not to waste any water, as there will be no more pumped at present.

"By order of
"THE BOARD OF HEALTH."

Nov. 10, 1910.

"J. Allen Kirk,
Sec. Board of Health,
Quarryville, Pa.

"Dear Sir:—Answering your letter of Nov. 7th, permit me to say that at the present time the public must rely on the boiling of water. We have treated the water in the reservoir with a disinfectant. Our engineers came in from the field and stated that there is not enough flow from the springs feeding the reservoir to supply water enough to flush the pipe and drain the reservoir and to fill it again and the pipes and supply the consumers. When the flow of the springs is sufficient, we will see that the flushing of the pipes is accomplished. Of course water enough could be secured from the polluted source which has been abandoned by our orders, but do you not think it would be the height of folly to put in more polluted water into the system. This is the view we take of it.

"Now with respect to a permanent remedy, an adequate supply of pure water sufficient for all purposes at all times be secured by the water company and we are studying the situation and will report fully to the town council and your Board of Health just as soon as it is possible to do so as to permanent remedies and the State will compel the water company to provide a pure and wholesome supply or the company's charter will be taken away."

"Yours truly,
(Signed) "SAMUEL G. DIXON."

"Dr. Samuel G. Dixon,
Harrisburg, Penna.

"November 12, 1910.

"Dear Sir:—We have been retained by the Board of Health of the Borough of Quarryville, this County, to assist them in their efforts to stamp out the epidemic of typhoid fever. The Board has followed your instructions in the matter of notifying all of the people to boil the water. They notified the Water Company to clean its reservoir, flush its pipes and take certain other measures for wiping out the pollution. The Company has refused to follow their instructions and openly defies the Board. The Board tells us that in response to your letter requesting samples of the water these samples were sent to you but that they have not yet had any report as to the result of the analysis. Can you advise us when that may be expected?

"We learned from the Secretary of the Board, in going over this matter, that probably the original source of the pollution is the using of the Creek or stream which flows through Quarryville as a place of deposit for sewerage by some four or five or six of the residents of the Borough or vicinity, all of whom were notified by you to cease that operation but who paid no attention to your notice and, although they were notified a second time and brought before you at Harrisburg a third time, they have made no change in the deposit of their sewerage and defy and treat the order with contempt, so the Secretary of the Board of Health tells us.

"Yours truly,
(Signed) "COYLE & KELLER."

"Dr. Samuel G. Dixon, "November 12, 1910.

"Dear Sir:—The Board of Health of this Borough instruct its Secretary to write you and express gratification for your decision in the matter of the Quarryville Water Company and especially in regard to the abandonment of the infected Quarry pond enclosure. The whole population of the Borough join in accord with this Board in the hope that the abandonment is permanent.

"I am also instructed to ask you, if you will kindly send here a representative to meet this Local Board of Health and together consider and if possible devise some means by which the prompt discontinuance of sewage being emptied into the Beaver Creek be accomplished. When this is accomplished we feel that an effectual safe guard has been established in preventing the further spread of typhoid also a repetition of the outbreak.

"This Board of Health is very anxious that you will send your representative to meet them at an early date. They desire to make a thorough cleaning up.

"This should be borne in mind:—We had good pure water until a few years ago when the Water Company bought this small farm which contains the old abandoned Quarry pond and the spring adjoining it, and through which the polluted Creek runs within 40 feet of the spring and at higher elevation.

"The surface of the pond is lower than the stream most of the time. It has an outlet which when the stream rises a few inches becomes an inlet and the bulk of the filth is admitted to the Pond.

"The most of the sewers were emptying into the stream before the Water Company bought this farm, and they were fully cognizant of the situation, hence the strong objections of the people of this end of the Borough against using this water.

"The Water Company have tried to excuse themselves by saying that they "Had a good water supply there, and that it was spoiled by the sewers,"—it was spoiled before they got it.

"It is situated in the lowest part of the Borough where it is at all times subject to contamination of every source available.

"Very truly yours,
(Signed) "J. ALLEN KIRK, Secretary."

"The Quarryville Water Company, "November 19th, 1910.
A. S. Harkness, Secy.,
Quarryville, Lancaster Co., Pa.

"Gentlemen:—Your letter of Mr. Ennis of November 18th, is before me. The Commonwealth cannot sanction and assume with you responsibility lightly. You should reach a determination as to a permanent source of additional water supply, and prepared plans therefor must be approved by this Department. With respect to the temporary use of the stream that flows into the Little Beaver near your pumping station, you must show that this is a safe source of emergency supply or if the water is dangerous at times you must show what you purpose to do to render it safe, and you must submit plans. For your information, permit me to suggest that you make a sketch of the watershed and thereon indicate the location of all buildings. Make an inspection and set before me all the facts about the disposal of the household waste, including sewage, dirty wash water, barnyard drainage, etc. One thing is certain, that the raw water can not be used by you with State approval unless it is subjected to chemical treatment and the plans and description of the process will have to be submitted for approval at this office. Mr. Ennis will hand this letter to you and he will further ascertain from you what your plans may be and report to the Chief of the Engineering Division, and we will, as a Department, do all we can to assist you in this, your emergency."

Yours truly,
(Signed) SAMUEL G. DIXON."

On December 6th, 1910 the following petition signed by 164 names was received:

"Dr. Samuel G. Dixon,
Commissioner of Health.

Dear Sir:—Respectfully, we the undersigned residents of Quarryville Borough, earnestly protest against the use of the waters from the Creek which has its rise in Faden Township, and in the tracts of the Pennsylvania Railroad, and which is proposed to be pumped from a point in said Creek within 75 feet of the infected Beaver Creek, and we pray that you will not allow the same to be pumped into the reservoir."

"December 6th, 1910.

"J. O. Byers,
Burgess, et al.
Quarryville, Pa.

"Dear Sir:—I am in receipt this day of a petition from you and many other citizens of Quarryville borough protesting against the use of the waters of McAllister's Run, so called by the Quarryville Water Company. The petitioners while protesting against one source of supply, do not offer any substitute.

"The Department has made an extended investigation of local conditions and a water famine stares the borough in the face. It is possible under the direction of the State Department of Health for the water company to take McAllister Run water and by treating it supply the public from this source without injury to public health. This may have to be done for two or three weeks pending the erection of a water purification plant which the Department has compelled the water company to build. When this plant is completed McAllister Run water can be filtered, purified and supplied during the summer season and a drought, into the water pipes of the water works system, and make up in this way any deficiency from the present source. Most of the months in the year the springs will be ample to furnish the gravity supply to the town.

"The Department has approved McAllister Run only as an auxiliary source. The reason that the Department did not permit the water company to filter the Quarryville spring water was that there is a constant sewage pollution of Little Beaver Creek which feeds the Quarry pond and the Quarry spring, while there is no constant sewage pollution of McAllister Run and it is easily within the bounds of possibility to keep pathogenic organisms out of these waters; so that of the two sources, the Quarry spring or McAllister Run, the latter is much to be preferred.

"A drilled well supply might be obtained but there is no assurance that it would not be polluted. Usually water drawn from the ground on limestone formation is polluted and requires to be filtered. Furthermore, you are accustomed to the soft water from the spring. Water taken from the ground would be very hard and cost each householder quite a considerable sum of money during the year for additional soap.

"In view of all these circumstances and the added one that a permit has been issued to the water company after due investigation of the entire subject to erect a filter plant and taking water from McAllister Run, your request that the Water Company be not allowed to pump the run water into the reservoir, must be denied.

"Yours truly,
(Signed SAMUEL G. DIXON."

General Conditions.

Quarryville Borough is a substantial residential community and trading centre located on Little Beaver Creek in the Southeastern part of Lancaster County, about 14 miles south of Lancaster city. The population of the Borough is about 700. In 1900 it was 565. The incorporated territory comprises about 600 acres, irregular in shape and bounded on the North, East and South by Eden Township, and on the West by Providence and East Drumore Townships.

The Lancaster and Reading narrow gauge railroad passes south through the centre of the borough, connecting Lancaster city with Oxford, several miles beyond Quarryville. The Conestoga Traction Company operates a trolley line through the city. The low grade freight line of the Pennsylvania Railroad passes through the Northern part of the Borough.

Quarryville lies in a rich agricultural district. With the exception of a shoe factory, grist mill, carriage works and three creameries, all of which employ about a total of 40 hands, the Borough is dependent on agricultural pursuits.

The business part of the town is along State Street extending east and west throughout the municipal territory. North and south from State Street, are Lime, Hess and Church Streets. Paralleling State Street and to the south of it are Second, Third, Fourth and Fifth Streets. Along these highways which traverse about one half of the municipal area, are the dwellings and places of business in the built up section. Beyond this territory, are a few scattered dwellings and farmsteads.

Little Beaver Creek enters the Borough from the south and flows through farming territory for about half a mile to Lime Street, under which it passes near Park Street and turning to the west it again passes under Lime Street and Second Street and thence northerly between Hess and Lime Streets it passes under State and continuing in the same general course, leaves the Borough at the narrow gauge road. Within a distance of 1,200 feet along the Creek between Lime and State Streets there are ten private sewers emptying into the stream and in addition to this pollution there are privies overhanging the stream and waste and wash water from two creameries are also discharged into it. The flow of water during the summer season is small in volume and in consequence the discharge of sewage and polluting matter into the Creek makes it more or less of an open sewer and a nuisance and menace to public health. Complaints relative to the nuisance have been made to the State Department of Health. This condition is of peculiar importance because of the menace to the source of the supply obtained at times by the Water Company and given to the public in the Borough which source is adjacent to the Creek and below the village and the sewer outlets.

Little Beaver Creek has its source about one mile south of the Borough. It joins Big Beaver Creek about three miles beyond Quarryville and this stream in turn empties into Pequea Creek, a tributary of the Susquehanna River. The entire watershed is distinctly an agricultural one. The surface drainage facilities in the town are ample for practical purposes. Along the channel of the Little Beaver the banks are about four feet high, from which the ground slopes at a quite uniform ascending grade to elevations about 20 feet at the eastern and western boundaries of the Borough.

The private sewers mentioned afford the only sewerage facilities in Quarryville. The general method of sewage disposal is into dug vaults which are generally in a sanitary condition. There are about 75 such vaults and in the neighborhood of 25 cesspools of the percolating type. The underlying formation is limestone and in a number of instances drainage rapidly percolates away through the crevices in the rocks. As far as the Department is informed, there are six dug wells and two drilled wells on individual properties in the Borough. The public supply is furnished by the Quarryville Water Company and the water is generally used.

A sanitary survey of the Borough was made by Officers of the State Department of Health during the season of 1906. Nineteen sources of sewage pollution of Little Beaver Creek were discovered.

On December 28th, 1906 the following communication was addressed to the President and members of the Borough Council:—

"Gentlemen:—It appears that the small stream coming down through your municipality receives the discharge of numerous sewers, thereby rendering the stream a general sewer to the discomfort and menace to the owners of property in the vicinity of the stream and also in the Borough, and after having investigations made I have determined this practice to be against the interests of the public health. It seems advisable that a consultation should be had with respect to the question of the best way of accomplishing the removal of these menaces and for the purpose I shall be very glad to see you and the owners of the various sewers at my office in Harrisburg on January 16th, at 10 a. m., subject to change."

"Yours very truly,
"SAMUEL G. DIXON."

The following communication was also sent by the Commissioner of Health to the owners of property from which sewage was emptied into the stream:—

"Complaint has been formally made to this Department about the sewage and waste pollution of Little Beaver Creek and upon investigation it is reported to me that sewage from your premises is being discharged into said stream. This is to notify you that in the interests of public health such discharge must cease, and for that purpose it may be well for the owners of the various sewers now discharging into said stream, and for the Borough authorities to meet with the Commissioner of Health at his office in Harrisburg to discuss the matter of how best to bring about an abatement or removal of the menaces, and for that purpose I shall be very glad to meet you with the others on January 16th, 1907, at 10 a. m. subject to change."

A conference was held at which it was proposed that sufficient time be given the citizens of Quarryville to study the problem of a general sewerage system. Nothing however, appears to have been done. On June 20th, 1907, the Commissioner of Health again sent a communication to the individual sewer owners. The following is a copy of it:

"Complaint has been formally made and is on record in this Department alleging that sewage from your property finds its way directly or indirectly into Little Beaver Creek which flows through the Borough of Quarryville, which discharge contributes materially to a nuisance in said Creek. Under the law such pollution is illegal and I hereby request that you inform me what reason you have to urge why the Commissioner of Health should not enforce the law by ordering the immediate discontinuance of such discharge from your property into the stream. I am sending a similar notification to all of those known by me to be making a similar discharge of sewage into the stream. A prompt reply to this inquiry is desired."

During the summer of 1907, and in response to the above notification a few of the private sewers were discontinued and some of the other pollutions were removed. In the following table appears a statement relative to the ten sewers now emptying into Little Beaver Creek in the Borough given in order down stream. It will appear from this table that there are 23 separate properties connected to the ten sewers and that there are 16 owners of the properties. Among the number two are hotels and a business block. Along Park Street there is a small run which receives the wastes from the two farmers creameries owned by the Abbott Creamery Company of Philadelphia.

Location.	Owner.	Diameter of sewer—in inches.	Length of sewer—in feet.	Number of properties connected.
Between Second and Lime St.,	Calvin B. Brown,	4	100	1
Between Second and State Sts.,	H. F. W. LeFever,	4	150	1
	H. F. W. LeFever,	4	100	1
	S. J. Hindman,	4	300	1
	S. J. Hindman,	4	300	1
	A. B. Fritz,	4	50	1
State St.,	Simon Groff, L. F. McAllister,	6	250	2
State St.,	L. Haines Dickinson, H. F. W. LeFever (2 houses), Amos Gilbert, J. H. Dick, C. C. Kirk (Hotel), A. D. Conner, Martin Fritz, W. J. Hess, J. A. Groff,	12	450	10
North of State St.,	I. Haines Dickinson, Amos Gilbert,	4	100	2
North of State St.,	Farmers' Nat'l Bank Building, W. Galen Fritz (Hotel),	6	500	3

Water Works System.

The Borough receives its water supply from the Quarryville Water Company chartered February 6th, 1894, to supply water to the public in the Borough of Quarryville. The works were built the same year and the source of supply was obtained from two springs, namely Silver Spring and Reade Spring. In 1904, an additional or auxiliary source was obtained from a spring in a quarry.

The water flows by gravity to a distributing reservoir from the first two springs. It is pumped into the pipe system from the Quarry Spring.

Reade Spring is located in East Drumore Township, about one mile southeast of the borough on the water company's land. The spring is enclosed in dry masonary walls within a frame building provided with a door kept unlocked because the tenant on the farm procures his water supply from this spring. A four inch tile pipe 30 feet long conveys the water from the spring to a receiving well of open masonry construction five feet in diameter and six feet deep. The top is covered with a concrete roof provided with an iron manhole cover which is kept locked. The side walls permit infiltration of ground water. A few feet down the slope there is a concrete wall about 100 feet long sunk about four feet in the ground. This serves to block the flow of water from numerous under ground springs in the vicinity and it also collects surface water from a small surface area above. These waters percolate through the ground into the receiving well.

The drainage area above the spring is of few acres in extent only, and there are no dwellings on it. The nearest buildings above the spring are 600 feet distant. They consist of a house, a barn and other structures belonging to the property. The drainage from these buildings cannot reach the spring. The dwellings belong to the farm on which the spring is located and are occupied by one family. It is located 250 feet distant and below the spring. The occupants go to the spring house and bucket up the water. There has been no typhoid fever at either of these houses during the past five years, so it is reported.

From the receiving well the water flows through a four inch cast iron gravity main a distance of about one mile entering the village at Church Street and Fourth Street, where it directly supplies what is known as the high service district. A four inch pipe extends down Church Street to State and both ways in State Street, probably as far as Hess to the east. In Second and Third Streets two inch pipes branch from Church Street and extend to Hess. And in Fourth Street 2 inch pipe extends from Church Street easterly about 500 feet, connecting with the eight inch gravity main from the low service distributing reservoir. Near this connection and on the two inch pipe there is a check valve which permits surplus water from the high service to flow into the low service system, but prevents any return from the low to the high service. There is a difference of 78 vertical feet between Reade Spring and the ground at the corner of Fourth and Church Streets.

The elevation of high water level in the distributing reservoir is 70 feet lower than Reade Spring. The supply to this reservoir is ordinarily from Silver Spring, and during droughts the deficiency is made up from the pumping service.

Silver Spring outcrops on a hillside in the Borough South of Fifth Street on land owned by the Water Company. It is enclosed in open masonry work provided with a wooden cover in a dilapidated condition. Surface water cannot enter the well. There is a wooden fence enclosure, but the gate is not kept locked. The nearest dwelling is 500 feet distant and at a lower elevation. The distributing reservoir is on Catherine street at the corner of Fifth. A four inch cast iron pipe 608 feet long delivers the water from Silver Spring into the reservoir. This structure is 70 feet square in plan and 9.5 feet deep to the flow line. It holds nearly 400,000 gallons. The bottom consists of a concrete floor, the side or retaining walls are of cement masonry and there is a five foot board fence enclosure which includes possibly three acres. The gate is kept open, the Water Company having found it impracticable to keep the public away from the reservoir while locking the gate. When this has been tried, vandals tear down the pickets and force admission. There is one common inlet and outlet eight inches in diameter located in one corner and projecting vertically about six inches from the bottom of the reservoir. The only way provided for draining the reservoir is to empty the distributing pipe system. The high water level is controlled by an overflow pipe six inches in diameter which extends horizontally through the embankment and discharges into the gutter on Catherine Street. This level is 60 feet above the lower part of town and 30 feet or thereabouts above the higher portions of the low service district.

The water from the Silver Spring is admitted to the reservoir at the south side about mid-depth. It is drawn out on the northeast corner through the eight inch pipe which extends to Fourth, in Fourth to Hess and in Hess to State Street, thence east in State Street for several hundred feet reducing to two inches. There are also two inch branch pipes in Second and Third Streets to Park and a four inch pipe in Park Street extending to the pumping station at the Quarry Spring.

On the low service it is estimated that 400 persons are supplied with water and on the high service about half this number. With a per capita consumption of 50 gallons daily, the total amount of water consumed every twenty-four hours is in the neighborhood of 30,000 gallons. It is estimated that 9,000 gallons are contributed from the Reade Spring during the dry season, leaving 21,000 gallons to be supplied in the low service by the Silver Spring and the pumps. It is also estimated that Silver Spring furnishes approximately 7,000 gallons daily during the dry times, and it is known that approximately 14,000 gallons in 24 hours have been pumped into the low service from the Quarry Spring.

Quarry Spring is located in the extreme Northern part of the Borough on the South bank of Little Beaver Creek 1,000 feet down stream from the nearest sewer outlet. The spring is 30 feet from the Creek and six feet from an abandoned limestone quarry now filled with water. The spring is in the bottom of a lime rock excavation and is undoubtedly fed from the Creek and the Quarry pond. The excavation is lined on the sides with brick masonry made water tight and forms a pool 25 feet square in plan by six feet deep. The ground surface between the pool and the Creek is elevated about three feet above the water in the Little Beaver. Separating the spring pool from the Quarry pond is the brick masonry diameter. They are provided with wooden plugs and it is reported that the Water Company never removed these plugs to permit the entrance of the Quarry pond water. The Quarry pond covers an area of about two acres and is about 12 feet deep. There is a six inch wooden trough overflow from the pond to the Creek, but on the day of the Department's inspection, November 5th, 1910, water was flowing from the Creek into the pond by means of the wooden trough. Ordinarily the water level of the Creek is about equal to that in the Quarry pond and the Spring pool level is a few inches higher when water is not being pumped from the pool.

A high board fence encloses the spring and adjoining the enclosure is a brick pumping station in which is installed one 10 H. P. vertical tubular boiler and one Platt horizontal duplex pump, rated capacity 200,000 gallons in 24 hours. The water is raised by means of a five inch suction pipe and a four inch force main 1900 feet long in Park and Lime Street, connecting with the low service distributing system. Water to reach the distributing reservoir must pass through the pipe system and overflow therefrom. According to plans on file in the Department, the four inch force main has three branch two inch pipes from it through which water must flow to reach the four inch main in Hess street, having a direct connection to the reservoir. Quarry Spring is used each year during the summer months. The current season the pump was started in July and continued until October 28th, at which time the Local Board of Health ordered the discontinuance of the spring as a source of water supply to the public. During ordinary operations it is customary to pump twice each week, making runs of about six hours. There is but one fire hydrant on the entire system. It is on the high service system at the corner of Church and State Street. The citizens have contributed to the formation and maintenance of a local Fire Company. The apparatus consists of a chemical extinguisher and appurtenances.

Typhoid Fever Outbreak During 1910.

On October 6th, the State Department of Health received written information from a citizen of Quarryville to the effect that there was typhoid fever in the Borough, and that the poison was being discharged into the Creek within a short distance of the main supply of the town, and that the Local Board of Health was doing nothing about it. Immediately the Department communicated with the Secretary of the Quarryville Board of Health, putting the responsibility for initiatory action upon the local authorities. On October 31st, an Officer of the Department collected samples of water supplied by the Quarryville Water Company. The results reported from the Laboratory on the fourth of November showed Beaver Creek water to be polluted with sewage and one sewage organism in a cubic centimeter of water was found in the sample collected from the Quarry bond. However the sample of water from the pump well and from a tap in the town was free from contamination. Because of the suspicion as to the purity of the Quarry Spring supply, the Department instructed Engineer Ennis and Inspector Ritter to go to Quarryville and conduct thorough investigations. They arrived in Quarryville on November 5th. By order of the Local Board of Health issued on October 28th, the Water Company had ceased to use the Quarry Spring and the Spring has not been used since by the Water Company. This has occasioned the threatened water famine mentioned in the Company's application now before the Department. The Department's representative immediately supervised the disinfection of the water in the distributing reservoir and notified the Water Company that it must secure some satisfactory source of supply other than the Quarry Spring.

Facts relative to the typhoid fever cases up to, and including November 18th, are given in the following table:—

No.	Date of onset.	Name of Patient.	Age.	Occupation.
1	Aug. 24	Horace B. Waltman, Park avenue.	23	Shoe Factory.
2	Sept. 13	Jos. Hess, State street,	52	Laborer (Hotel
3	Oct. 8	Florence McCandle, Broad street,	18	Housewife.
4	Oct. 8	Francis Conlin, Hess street,	10	School.
5	Oct. 8	Olive Myers, Lime street,	18	School.
6	Oct. 10	Harry Oatman, Lime street,	39	Painter.
7	Oct. 11	Ellis E. Ferguson, State street,	39	Clerk.
8	Oct. 14	Mrs. L. F. McAllister, State and Hess streets,	47	Wife.
9	Oct. 20	James D. Gilbert, Lime and State streets,	17	School.
10	Oct. 22	Mary Geiger, State street,	24	Clerk.
11	Oct. 24	Clair Book, Hess street,	16	School.
12	Oct. 27	Edgar W. Gable, State street,	19	Butcher.
13	Oct. 29	Mary Emma Book, Hess street,	8	School.
14	Nov. 1	Francis Oatman, Lime street,	10	School.
15	Nov. 5	John O. Book, State street,	10	School.
16	Nov. 7	Ellen Brown, Lime street,	40	Wife.
17	Nov. 12	Katie Myers, Broad street,	15	School.
18	Nov. 16	Lettie Herr, Park avenue,	12	School.
19	Nov. 18	Mary Book, State street,	13	School.

No.	No. in family.	Water Supply.		Sewage Disposal.			Milk.	Origin of case.
		Well.	Public.	Privy.	Cesspool.	Sewer.		
1	6	Drilled.	Public,	Privy,			Creamery,	First case.
2	Hotel,		Public,			Sewer,	Own,	
3	5		Public,	Privy,			Barr,	Imported.
4	6		Public,			Sewer,	Barr,	
5	3		Public,	Privy,			Barr,	
6	3		Public,	Privy,			Barr,	
7	2		Public,		Cesspool,		Barr,	
8	3		Public,			Sewer,	Barr,	
9	6		Public,			Sewer,	Barr,	
10	3		Public,		Cesspool,		Barr,	
11	8		Public,		Cesspool,		Barr,	
12	7		Public,	Privy,			Barr,	
13	8		Public,		Cesspool,		Barr,	Secondary.
14	3		Public,	Privy,			Barr,	Secondary.
15	6		Public,	Privy,			Barr,	
16	4		Public,			Sewer,	Barr,	
17	4		Public,			Sewer,	Barr,	
18	11		Public,	Privy,			Creamery,	
19	6		Public,	Privy,			Barr,	Secondary.

The Borough of Quarryville has been free from typhoid fever in recent years. The local Health authorities report that prior to the current season there has not been a case of typhoid in the Borough in several years. The records in the office of the State Department of Health show one case only between September, 1905 and August 1st, 1910. This case occurred in 1906. Between August 24th and November 18th inclusive of the current year there were 19 cases of typhoid fever, one of which proved fatal.

The first patient, though feeling ill, was about his home for a number of days before the physician was consulted, and during this time, a surface privy was used located on rising ground about 40 feet from a small run extending down by the creameries and crossing and recrossing Park Street to Little Beaver Creek near Second and Pine Streets. Wash water and kitchen wastes were thrown onto the ground on the slope near the privy. The vault was full and overflowing. Stools were not disinfected until after the physician was called. The Field Officers reported that typhoid infection from this property could have reached the run and the Creek above the Quarry Pond.

The second case occurred 22 days after the first case in the person of the man employed at the Hotel. Until he was removed to the hospital at Lancaster, some days later, where he died, the discharges without disinfection passed through the sewer to the Creek at a point a few hundred feet above Quarry Pond.

The next three cases occurred 23 days later, one of which was imported, the other two being school children. At the home of one of these children there was a sewer discharging to the Creek, and through this means during the early stage of the disease, it is probable that that pathogenic poison without disinfection reached the Creek.

Within the next week there were three cases. In one instance there being a sewer from the house to the Creek. The onset of the last of these cases was on October 14. On October 20th, 22nd and 24th, there was a case each day reported, at the home of one of which there was a sewer. At another there was an overflowing cesspool connected to the Creek, on the Book property. Another occurred on this property on October 29th.

The only other cases occurring on properties having sewer connection to the Creek were the two, one on November 7th, and one on November 12th. Thus there were nine cases of typhoid fever from August 24th, to November 12th inclusive—seven weeks—on eighth properties from which sewage reached the stream used at a point further down as an indirect source of supply to the public water works system.

The investigation by the Department revealed certain prominent facts, namely first the cases, with the exception of the original one, were all in the district supplied from the Quarry Spring; second, the case, with four exceptions, were grouped together along State Street and vicinity where the Quarry Spring water first reached the consumers, this being the thickly built up part of the village; third the milk supply, with three exceptions, was from the same source; and fourth, ten cases were of children attending the same public school.

With respect to the public water supply being the medium of transmission of the infection, it appears from what has been stated hereinbefore, that it might have been the medium. Sewage reaching the Quarry pond from the creek would be subjected to about 200 days sedimentation, but the feeding of the Quarry Spring would naturally be from the bottom of the pond. In consequence the barrier which the pond would afford to the transmission of the infection would be more largely that of the retention of the pathogenic organisms suspended in the body of the water long enough to bring about their natural death or their greatly diminished virulence. If this reasoning be correct, the infection of the Quarry Spring would be more likely to be of the milder type and in consequence there would follow a less percentage of cases outbreaking among the water consumers, and owing to the physical conditions with respect to the probable connection between the Quarry Spring and the Quarry Pond, the contamination of the spring water by any foreign matter in the Quarry Pond would be more likely to be distributed over a period of time. The facts as to the outbreak among the consumers would seem to corroborate these conclusions. In the following table is given the analyses of the public water sources and supply in the pumping district:

Date of collection.	Tests by Whom.	Location of Sample	Bacteria Per c. c.	
			Total	B. Coli.
Last week Oct.	J. E. Goodell, City Chemist, Lancaster,	Quarry Spring,	12,000	800
		Tap in town,	200	50
Oct. 31	State Department of Health,	Beaver Creek,	18,000	260
Oct. 31	State Department of Health,	Quarry Pond,	100	1
Oct. 31	State Department of Health,	Quarry Spring,	340	0
Oct. 31	State Department of Health,	Tap in town,	33	0
		After Sterilization of Reservoir Water.		
Nov. 9	State Department of Health,	Beaver Creek,	360	48
Nov. 9	State Department of Health,	Quarry Pond,	80	0
Nov. 9	State Department of Health,	Quarry Spring,	16	0
Nov. 9	State Department of Health,	Reservoir,	160	0
Nov. 9	State Department of Health,	Silver Spring,	4	0
Nov. 9	State Department of Health,	Tap Hotel,	8	0

Samples of water from Reade Spring were analyzed by the Department and no contamination was found.

With respect to the milk supply, a large percentage of the citizens of the town obtain their milk from D. Frank Barr, the only dealer in Quarryville. Out of 119 families supplied by this man only 13 developed typhoid. Another significant fact is that in these 13 families there was a total of 15 cases only, two of them being secondary and one of them being imported. Mr. Barr observed the regulations of the Department with respect to the interchange of milk containers at the premises whereon a case or suspended case of typhoid fever existed, so it is reported but there might have been the possibility of a spread of the infection in this manner.

A more reasonable means of infection might have occurred at the public school. Ten of the 19 cases attended school in the same building and drank water from a common dipper at the well pump on the premises and thus through means of contact, or otherwise, the disease might have been spread. The facts will not be known. The Department collected one sample of the well water and found it to be uncontaminated.

A sample of well water at Waltman's was analyzed and found to be pure. The Hess well from which water has been drank by Mr. Ferguson showed no pollution, but the well at Oatman's from which the Gilbert boy frequently drank water was found to be grossly polluted with sewage. This well is dug 22 feet deep and is topped with a platform and pump. The result of the Department's analyses of this water was given to the local health authorities. Whatever the cause or causes of the typhoid outbreak in Quarryville during the summer season just closed, it is certain that the Quarry Spring is a dangerous source of supply of public water and that its use for this purpose should be abandoned. It is also clear that the interests of public health demand that no sewage should be discharged into the Little Beaver Creek.

Proposed Auxiliary Source and Filtration Plant.

On November 18th the Quarryville Water Company asked permission to obtain an auxiliary source of water supply from a small stream tributary to Little Beaver Creek called McAllister's Run. On the Company's application the following representations are made::—

"We have resorted to all known methods here to try to get our reservoir filled with water from the Reade and Silver Springs, but in spite of all economy, there is a gradual lowering until we now have three feet seven inches of water in the reservoir.

"Nothing short of a prolonged rain or snow storm within the next two weeks, will save the situation without pumping from some source."

"Will the Department of Health not permit us to lay a pipe and pump water from the large stream that flows into the Little Beaver near our pumping plant?

"This water all originates within a short distance of our plant and at this season of the year is not contaminated by stock or otherwise, and if we were permitted we will flush all pipes, clean the reservoir and fill it for reserve.

"As all consumers are boiling the water supplied at present, we think this method is preferable to being without water and it seems impossible to build a filter plant in time to serve this emergency.

"If the State insists on the building of a filter plant then we will erect such plant in conformity with the plans herewith submitted, subject to the approval of the Commissioner of Health.

"Kindly have a report on this proposition as early as possible, and oblige."

The small tributary which the Water Company desires to use as an auxiliary water supply has its source in Eden Township about one mile East of the Borough. It follows a Westerly course of about one and a half miles, passing through the Northern part of the Borough territory and joining the Little Beaver Creek opposite the Water Company's pumping station. The stream heads in a deep cut through which passes the low grade freight line of the Pennsylvania Railroad system. There are no passenger trains that run over these tracks.

The drainage area comprises approximately one square mile of cultivated and sparsely wooded land on which are five farms, one unoccupied and dwelling and 32 inhabitants All of the buildings with one exception are located at least 200 feet from the stream. The nearest building is a house 30 feet from the run. It is a tenement. On the property is a privy vault 35 feet distant from the stream. Kitchen wastes and wash water are thrown on the ground surface. The method of disposal of household waste is the same at all the farms. There is no direct dry weather pollution, but in wet weather some barnyard drainage may reach the run.

While the Water Company, it is supposed, will not have use for McAllister's Run water, except in dry weather, nevertheless, even then the water would not be safe to use for drinking purposes without filtration. Near the pumping station it is purposed to install the filter house. In this house a centrifugal pump to be operated by a steam engine will be installed, and will raise the water from an intake dam to be built in the run to a subsidence tank to be erected on the outside of the filter house. The capacity and location of the dam has not been stated by the Water Company.

The subsidence tank is to be a cypress tub 16 feet in diameter and 10 feet high with a capacity of 15,000 gallons, providing a period of 1.5 hours subsidence when the plant is operating at its maximum rate of 10,000 gallons per hour. The subsidence period at the present rate of consumption would be several times one and one half hours. However, the Company would probably run the plant at its rated capacity until the reservoir was filled and then shut down. Therefore the subsidence period should be more than doubled.

The water from the pump will enter the tub at the bottom and passing up through a vertical stilling chamber will flow out through holes in the wall into the main tank, travel around a baffle wall extending nearly across the centre of the tank and thence over a skimming board to the outlet pipe located near the top of the tank. This pipe will be six inches in diameter and will conduct the coagulated water from the tank to the filter unit inside of the building.

The coagulated solution is to be dissolved sulphate of alumina. A wooden tank for mixing will be set up in the filter house and the solution will be fed by gravity to the suction pipe of the centrifugal pump. It is also proposed to use the hypochlorite of lime process to further purify the water after it has been filtered. The method of mixing and feeding the chemical solutions have not been shown on plans or described.

The filter unit is to be a cypress tub 11 feet inside diameter. It is to rest on a reforced concrete water tight floor, said floor forming the top of a filter water basin 14 feet wide, 21 feet long and eight feet deep, having a storage capacity to the flow line of 10,000 gallons. About 4 feet of this reservoir will be underground. Steps will lead up on the surface to the floor of the filter house. The floor for operating the filter unit will be eight feet above the main floor and slightly below the top of the filter tub. This upper floor will support the mixing tank for the chemicals and on the main floor will be the feed tanks and centrifugal pump. The water will be delivered to a trough of steel six inches in width and extending around the inside circumference of the tank, over which the water will flow on to the filtering surface 16 inches below. A butterfly valve arrangement will regulate the water level on the filter.

The gridiron system on the bottom of the filter tub is to consist of a cast iron main collector from which will branch on eight inch centers in parallel lines from either side of the main collector heavy wrought iron pipes 1.5 inches in diameter into which the strainers are to be screwed. Concrete will be filled up around the piping flush with the strainers. On top will be placed eight inches of selected gravel supporting three feet of selected filtering sand. A rate controller of the type not stated is to be installed and also a loss of head gage.

The filter tub is to be provided with a rake operated by a valve and shaft connection to the steam engine. The washing is to be done with a reverse or upward current of water supplied through the gridiron system from force main pressure. In the washing process the rake agitator is revolved to stir up the sand layer and the filtered water obtained under pressure from the force main is supposed to have velocity enough upward to scour off foreign matter and remove it in the water through the surface where the flow is over the edge of the steel trough to the sewer. The success of this operation depends entirely upon their being sufficient velocity of the washing water through the sand. The force main is 4 inches in diameter only and about one mile long. The pipes in the town are directly connected to the reservoir which is on the opposite side of the Borough from the pumping station. The pressure at the filter plant is not likely to be sufficient when water is being consumed in the village to supply water enough for filter washing and for the village purposes. Since the latter is near the reservoir it would draw the water away from the filter house, hence some other means should be adopted to supply an adequate volume of water for washing purposes at the filter. A special pump can be installed and the water from the filtered water basin can be drawn upon.

The filter is so arranged that the first filtered water after washing can be wasted. This is important.

The filter plant will be installed by the Roberts Filter Manufacturing Company of Darby, Pa., under a guarantee that the plant will be capable of filtering 240,000 gallons of water in twenty-four hours when operated at the rate of 120 millions gallons an acre a day. The Company also guarantees that the filtered water will be bright, clear and free from turbidity or matter in suspension visible to the naked eye and when the number of bacteria contained in the raw or applied water exceeds 3,000 per cubic centimeter the filtered water shall show an average bacteria reduction of not less than 97 per cent. and when the number of bacteria in the raw or applied water will be less than 3,000 per cubic centimeter the average number of bacteria remaining in the filtered water shall not exceed 100 in 1cc.

Discussion.

On November 29th, 1910, the Commissioner of Health addressed a communication to the owner or part owner of every sewer emptying into Little Beaver Creek in Quarryville and he also addressed a communication to the Burgess and Town Council. Copies of them are as follows:—

"You as owner or part owner or user of a sewer discharging directly or indirectly into Little Beaver Creek within the Borough of Quarryville will be served by bearer of this communication with an order issued by me under the provisions of Act 182 of 1905 to discontinue the discharge of sewage into the waters of the State. Compliance with this order will put you to great inconvenience, but this cannot be helped. It is better that you should suffer inconvenience than that the entire public health should be imperiled. Unless you obey this order at the expiration of the time mentioned in the order I shall put the matter in the hands of the Attorney General. However, if the Burgess and Town Council will give satisfactory assurances that the Borough will prepare plans for an outfall sewer and sewer disposal works to intercept the flow from the existing private sewers and to provide sewerage for other estates in the village, then I will consider whether the interests of public health would not be better served by extending the time in which sewage from existing private sewers may continue to be discharged into Little Beaver Creek."

"To the Burgess and Town Council of Quarryville."

"An agent of my Department is serving a ten day notice upon each owner, or part owner or user of a sewer in Quarryville to discontinue the discharge of sewage into the waters of the State within ten days. You are well aware of the necessity of this order. The possible consequences of negligence on the part of the local authorities and private individuals to take up the sewerage question were stated to your predecessors by the Department. Unless you will give me satisfactory assurance that the Borough will immediately prepare plans for an outfall sewer and sewage disposal works to intercept the flow from the existing private sewers and to provide sewerage for other estates in the village, I shall put the matter of action against the private owners and users of the sewers in the hands of the Attorney General to compel if necessary these owners or users to close up the sewers altogether."

It will take thirty days of favorable weather for the erection and equipment of the filter plant. Meantime, there will be a shortage of water. The Water Company should take its emergency supply from McAllister's Run and this should be subjected to treatment with some germicide preferably hypo-chlorite of lime. The plans should be prepared by an expert and be submitted to the Commissioner of Health for approval. This treatment should be in some receptacle between the run and the pumps. The plans should be prepared without delay and the work can be done quickly. The contract for the filters should be let at once under approved conditions and the work should be completed within the shortest practicable time.

Decree of the Commissioner of Health.

On December 1st the Commissioner of Health issued a decree to the Quarryville Water Company permitting it to take a temporary supply from McAllister's Run, subject to the following conditions and stipulations:

FIRST: Quarry Spring is condemned and shall not be used at any time as a source of supply by the Water Company.

SECOND: An immediate auxiliary supply may be obtained from McAllister's Run provided the water is treated with a germicide according to plans and a report on process of the use of chemicals for coagulation and for submitted to the Commissioner of Health for approval. This temporary process is to be abandoned when the filter plant is put into commission.

THIRD: The filter plant plans to be modified as follows: The sedimentation tank shall be increased in capacity to provide for a four hour subsidence period when the plant is being operated at its rated capacity; a special pump and connections shall be provided to pump filtered water from the clear water basin to the filter at a rate sufficiently high to properly wash the filter; plans and a report on process of the use of chemicals for coagulation and for sterilization in connection with the filtration of the water shall be submitted for approval; and plans for the modifications shall be submitted by the Water Company to the Commissioner of Health, and be approved by him before the filter plant shall be constructed.

FOURTH: The Water Company shall make monthly inspections at every occupied dwelling on the watershed of McAllisters Run and shall adopt other means to gain intelligence of any unsanitary conditions or sickness of any one dwelling on the watershed and reports thereof shall be at once forwarded to the Commissioner of Health. If necessary in order to secure a proper disposal of sewage at the farms the Water Company shall lend financial assistance for the building of proper receptacles. Failure on the part of the Water Company to extend a reasonable amount of co-operation to preserve the purity of the surface waters of McAllister's Run may result in a condemnation of the McAllister Run supply by the Commissioner of Health.

FIFTH: The Water Company shall cause the bucketing of water from out of the Reade Spring to be discontinued. This practice is a menace to the health of the water consumers in the high service district. The door of the house over the spring should be kept locked. Water for use by the neighboring residents can be easily piped from the Spring and thus obviate any danger of contamination of the water in the stream.

SIXTH: Over Silver Spring a superstructure should be erected and the door should be kept securely locked.

SEVENTH: The Water Company shall provide an enclosure around the reservoir and see to it that this enclosure is kept locked. At the reservoir facilities for suitable drainage shall be provided and plans for this feature shall be submitted to the Commissioner of Health for approval.

EIGHT: Plans for the permanent intake dam on McAllister's Run shall be submitted for approval before the works are built and when the various plans herein called for by all of the provisions of this decree have been approved, it will be under stipulations regulating and controlling the operations of the filter plant and water works system.

On December 6th, the Water Company made the following application:

"That the Reservoir of the Quarryville Water Company is practically empty and whereas the Department of Health in the permit issued December 1st, 1910, has approved of the use of the waters of McAllister's Run as a temporary supply if treated with a germicide, preferably hypo-chlorites of lime, the Company has built a temporary wooden dam on the above mentioned Creek and connected it with the pumping station as shown in the accompanying sketches.

"The Company purposes to treat the water by introducing hypo-chlorite of lime in solution at the up stream end of the flume leading from the dam. The chemical will be dissolved in a barrel, the solution will then be emptied into a barrel located over the flume, the flow being regulated by a spigot, it being the intention to use approximately 1-10 grain to the gallon or enough to sterilize the water as determined by chemical analysis."

On December 8th, the Commissioner of Health issued a permit, subject to the following conditions and stipulations:

FIRST: That the use and application of the chemical shall be under the responsible supervision of the Company's consulting engineer who shall keep or cause to be kept daily records of the amount of chemical used, its application and the amount of water pumped and the hours when this pumping is done. Copies of these reports to be filed in the office of the State Department of Health.

SECOND: Daily bacteriological tests of the water shall be made by a chemist employed by the Water Company and copies of these reports shall be filed by the Water Company in the office of the State Department of Health.

THIRD: The Company shall forthwith have prepared by its engineers plans for the permanent location and construction of the dam and appurtenances and these plans shall be submitted to the Commissioner of Health for approval on or before the time when the modified plans for the filtration plant shall be submitted to the Commissioner of Health.

FOURTH: All of the relevant conditions of the permit of December 1st, 1910 shall be and remain in full force.

VI.—REFERENCES TO SPECIAL COUNCIL.

During the year 1910 there were sixty-one cases referred to the Department Attorneys for final adjustment. Twenty-eight of these cases were settled during the year and thirty-three are pending settlement.

Thirty-six cases referred previous to 1910 were settled during the year.

These cases, by counties are shown on the following table:

County.	Attorneys.	Cases closed in 1910—Referred previous to 1910.	Cases referred in 1910.	1910 cases closed in 1910.	1910 cases pending at end of year.
Adams,	Robert, E. Wible,	0	1	1	0
Berks,	Williams & Sinkler,	22	8	3	5
Blair,	Craig & Culp,	0	2	2	0
Butler,	John M. Greer,	3	0	0	0
Cambria,	Robert S. Murphy,	2	12	3	9
Chester,	Williams & Sinkler,	2	1	0	1
Columbia,	A. W. Duy,	3	2	1	1
Delaware,	Williams & Sinkler,	0	1	1	0
Erie,	Milton Shreve,	1	0	0	0
Fayette,	A. E. Jones,	0	1	1	0
Indiana,	Langham & Elkins,	0	2	1	1
Lancaster,	W. U. Hensel,	1	0	0	0
Lackawanna,	Coyle & Keller,	0	1	0	1
Lebanon,	E. C. Ammerman,	0	1	0	1
Lehigh,	Williams & Sinkler,	2	2	1	1
Lycoming,	James L. Marsteller,	0	17	8	9
Montgomery,	John G. Reading,	0	1	1	0
Venango,	Williams & Sinkler,	0	1	0	1
Warren,	John L. Nesbit,	0	1	0	1
Westmoreland,	Hinckley, Alexander & Clark,	0	1	1	0
York,	Joseph A. McCurdy,	0	4	3	1
	George Hay Kain,	0	2	1	1
Total,		36	61	28	33

The case of B. F. Shaffer, Levi Shaffer, The Glen Rock Stamping Company, J. M. Grove, L. C. Grove and I. F. Grove, Glen Rock, Borough, York County; pollution of Codorus Creek, was referred in 1909, and on October 20th of that year a true bill was returned by the Grand Jury. The defendants immediately took an appeal from the order of the Commissioner. On March 21st, 1910, Judge Wanner dismissed the exceptions taken to the order of the Commissioner in this case and placed the costs on the defendant. Testimony was heard on civil suits before Judge Wanner on October 22nd, 1910, and argument was heard November 29th, 1910. The criminal suits were continued until the January term of Court, 1911.

The case against the Borough of East Washington continued from 1909, was instituted on account of an alleged nuisance in the above mentioned borough, by the operation of disposal plant in the Borough of East Washington, from which sewage is discharged into a small stream known as Catfish Run, in an unpurified and highly dangerous condition, rendering the stream a public nuisance, evident to the sight and smell for a distance through the thickly populated part of the Borough of Washington.

The case is based on the laws of the old Board of Health. The Attorney General assisted by local counsel, Messrs. Hughes and Hughes, of Washington, Pa., represented the Department and Messrs. McIlvain and Clark, of Washington, Pa., were the solicitors for East Washington Borough.

An injunction was filed on February 2nd, 1910, and a demurrer taking exception to this injunction was filed by the Borough of East Washington, April 13th, 1910.

Judge Galbraith, of Butler County, was called to hear the case argued and discussed. On September 27th, 1910, Judge Galbraith handed down an opinion overruling the demurrer and directed the defendant to answer the plaintiff's bill of complaint within thirty days of the filing of his opinion.

The Borough of East Washington filed their answer on the 29th of October 1910, also filing an objection to a trial before a jury. Case continued into 1911.

During the year, the following cases referred previous to 1910, were closed.

BERKS COUNTY. The case of Wallace A. Fraunfelter, Windsor Township, pollution of Maiden Creek, was withdrawn upon the abatement of stream pollution and payment of costs by defendant.

The case of Martin Zettlemoyer, Greenwich Township, pollution of Maiden Creek, was withdrawn upon the abatement of stream pollution and payment of costs by defendant.

The case of Stephen Slanker, Greenwich Township, pollution of Maiden Creek, was withdrawn on account of the abatement of the stream pollution and payment of costs by defendant.

The case of John Baver, Greenwich Township, pollution of Maiden Creek, was withdrawn owing to the abatement of stream pollution, the costs being paid by the defendant. In the four above mentioned cases, true bills were found, but owing to the fact that abatements had been effected before the trial, the District Attorney withdrew the cases upon the payment of costs by defendants.

The case of Penn Mengel, owner, Charles Shitler, tenant, Ruscomb Manor Township, pollution of Maiden Creek, reported abated February 18th, 1910, without litigation.

The case of James Bramsinger, owner, T. R. Luckenville, tenant, Richmond Township, pollution of Maiden Creek. Reported abated March 21, 1910 without litigation.

The case of Harry Schmeck, stream pollution, continued from 1909, was withdrawn owing to the abatement of the pollution.

The case of William Miller, Windsor Township, pollution of Maiden Creek, was reported abated March 1st, 1910, without litigation.

The case of G. E. Buck, Greenwich Township, pollution of Maiden Creek, was reported abated March 4th, 1910. This case was withdrawn before the return to court, as the defendant had made an abatement and paid the Justice costs.

The case of Sassaman Adam, Windsor Township, pollution of Maiden Creek, was reported abated 1910 without litigation.

The case of Sylvanus Adam, Perry Township, pollution of Maiden Creek, was reported abated April 12th, 1910, without litigation.

The case of F. Ephraim Mengel, Maiden Creek Township, pollution of Maiden Creek, was reported abated after inspection by counsel March 25th, 1910, without litigation.

The case of Barbey Brewing Company, owners, Harry Hertzog, tenant, Boyertown Borough, pollution of a tributary of the Schuylkill River, was reported abated in 1910 without litigation.

The case of Adam Haag, owner, Thomas Weingert, tenant, Jefferson Township, pollution of a tributary of Schuylkill River, was withdrawn before the return to court, as the defendant had made an abatement and paid the costs.

The case of Joseph S. Hicks, Upper Bern Township, pollution of a tributary to the Schulykill River, was reported closed without litigation.

The case of Jacob W. Albright, owner, Daniel Alrick, tenant, Upper Bern Township, pollution of a tributary to the Schuylkill River, was reported abated 1910 after an inspection of counsel without litigation.

The case of Frank Miller, Upper Tulpehocken Township pollution of a tributary to Schuylkill River, was reported closed in 1910 without litigation.

The case of Jacob Leban, Maxatawney Township, pollution of Maiden Creek, was withdrawn before the return to court, as the defendant had made an abatement and paid the costs.

The case of Daniel Schmeck, owner, Howard Miller, tenant, Upper Alsace Township, pollution of Stony Creek, was withdrawn before the return to court, as the defendant had made an abatement and paid the costs.

The case of Elias Dietrich, Greenwich Township, pollution of Maiden Creek, was reported abated after an inspection by counsel March 25th, 1910, without litigation.

The case of George Miller, owner, Oliver Reppert, tenant, Windsor Township, pollution of Maiden Creek, was reported abated without litigation after an inspection by counsel April 22nd, 1910.

The case of John Trexler, Greenwich Township, pollution of Maiden Creek, was reported closed in 1910 without litigation.

BUTLER COUNTY. The case of Henry Eichenuer, Lancaster Township, pollution of the Connoquenessing Creek, was reported abated in 1910 without litigation.

The case of R. C. Fishkorn, Lancaster Township, pollution of Connoquenessing Creek, was reported abated in 1910 without litigation.

The case of Mrs. L. Eicholtz, owner, Frank Ward, tenant, Lancaster Township, pollution of Conoquenessing Creek, was reported abated in 1910, without litigation.

CAMBRIA COUNTY. The case of George Sell, Jackson Township, pollution of Hinkston Run, abatement reported 1910 without litigation.

The case of George Gillan, Jackson Township, pollution of Kingston Run, was reported abated in 1910 without litigation.

CHESTER COUNTY. The cases of Frank H. Jackson and C. A. Otto, both of Tredyffrin Township, were reported closed in 1910 without litigation. Both were stream pollution cases.

COLUMBIA COUNTY. The case of D. J. Donovan, Benton Borough, pollution of Fishing Creek, was reported closed in 1910 without litigation.

The case of Adam Morey, Benton Borough, pollution of Fishing Creek, was reported abated in 1910 without litigation.

ERIE COUNTY. The case of D. S. D. Sterret, McKean Township, stream pollution, was reported abated in 1910 without litigation.

LANCASTER COUNTY. The case of E. L. Garber, Lititz Borough, pollution of Lititz Creek, was reported abated April 7th, 1910, without litigation.

LEBANON COUNTY. The case of Rebecca Eckert, owner, Ira Wrigley, tenant, Mill Creek township, pollution of a tributary to the Schuylkill River, was reported abated in 1910 without litigation.

The case of Isaac Miller, Jackson Township, pollution of a tributary, to the Schuylkill River, was withdrawn before return to court, as the defendant had made an abatement and paid the costs.

A resume of the cases referred during 1910 follows:

ADAMS COUNTY. The case of D. W. Stoops, Highland Township, stream pollution was referred February 8th, and an abatement was reported April 2nd, without litigation.

BERKS COUNTY. The case of Peter Eshbach, owner, Edwin Eshbach, tenant, Colebrookdale Township, pollution of Schuylkill River, referred April 22nd. The case was continued into 1911.

The case of Edward Weller, Colebrookdale Township, pollution of Schuylkill River, was referred April 22nd, and was not closed at the end of the year.

The case of J. B. Barr, owner, Irwin Moyer, tenant, Colebrookdale Township, pollution of Schuylkill River, was referred April 22nd, and reported closed April 29th after an inspection by counsel.

The case of David Hornberger, owner, Calvin Young, tenant, Cunru Township, pollution of Schuylkill River, was referred May 10th and was continued into 1911.

The case of Harrison Kalbach, owner, Francis K. Stamm, tenant, North Heidelberg Township, pollution of Schuylkill River, was referred May 10th, and was reported closed after an inspection by counsel May 19th.

The case of A. W. Stitzel, Perry Township, pollution of Schuylkill River was referred March 9th, and continued at the end of the year.

The case of Jacob B. Barr, Colebrookdale Township, pollution of Schuylkill River, was referred April 22nd, and was not closed at the end of the year.

The case of Mrs. William Shomo, owner, Jacob Chapells, tenant, Perry Township, pollution of Schuylkill River was referred March 11th, and was reported closed after an inspection by counsel April 12th, 1910.

BLAIR COUNTY. The case of G. W. Wagner, Catherine Township, stream pollution was referred October 15th, and an abatement was reported December 16 without litigation.

The case of Robert Norris, Catherine Township, nuisance arising from slaughter house, was referred October 15th, 1910, and was reported closed without litigation.

CAMBRIA COUNTY. The case of Boyd Kinport, Susquehanna Township, nuisance arising from overflowing privy, was referred March 9th, and reported closed March 23rd, without litigation.

The case of J. M. Spenger, Stony Creek Township, nuisance arising from insanitary condition of slaughter house and pollution of stream therefrom, was referred August 29th, and reported closed September 7th, without litigation.

The case of Albert Kurtz, Stony Creek Township, nuisance rising from insanitary condition of slaughter house and pollution of stream therefrom, was referred April 4th, and reported closed without litigation, September 7th.

The following cases for stream pollution, were referred November 11th, and remained open at the end of the year:

Upper Yoder Township; James W. Hunt, Adam Keffer, W. V. Shaeffer and Joseph Makin.

Jackson Township; Arch Rose, Isaac Rose, Zacharias Varner and Walter Mackel.

West Taylor Township; W. S. Conner.

CHESTER COUNTY. The case of Daniel J. Voorhees, Schuylkill Township, nuisance arising from discharge of waste water from Washington Inn into street gutter was referred August 22nd, and was pending at tne end of the year.

COLUMBIA COUNTY. The case of Samuel Mordan, Madison Township, pollution of Fishing Creek, was referred December 7th, and reported closed December 28th, without litigation.

The case of Elmer Shaffer, Briar Creek Township, pollution of Briar Creek, was referred December 29th, and was pending at end of year.

DELAWARE COUNTY. The case of Joseph Rose, Agent, (Old Buck Inn) Haverford Township, nuisance arising from overflowing cesspool, was referred August 3rd, and reported abated December 30th, after inspection and interview by counsel.

FAYETTE COUNTY. The case of George Dyams, Redstone Township, nuisance arising from filthy hogpens and outhouses, was referred September 23rd, and reported closed October 17th, without litigation.

INDIANA COUNTY. The case of Mike Menno, Centre Township, nuisance arising from refuse matter in the public highway, was referred January 24th, and was reported closed after a letter of interview by counsel, April 15th.

The case of Frank Hess, Green Township, pollution of Dixon Run, was referred June 7th. Information was made on June 30th, and the case was returned to Court at the hearing on July 2nd. The Grand Jury returned a true bill on September 8th, and on the 19th of September Mr. Hess plead guilty to the charge of the indictment. Sentence was suspended pending the abatement. Partial abatement was made.

LANCASTER COUNTY. The case of J. C. Brobst, owner, Charles H. Brobst, tenant, Lititz Borough, pollution of Conestoga Creek, was referred December 2nd. Case pending at end of year.

LACKAWANNA COUNTY. The case of George Clark, South Abington Township, pollution of a stream used as a supply to Scranton, was referred December 30th. Case pending at end of year.

LEBANON COUNTY. The case of William A. Zellers, Jackson Township, pollution of Tulpehocken Creek, was referred July 9th. Information was made but the case was reported closed September 28th, as the defendant had made an abatement and paid the costs.

The case of John Bollinger, Jackson Township, pollution of Tulpehocken Creek, was referred July 9th. Information was made. Case pending at end of year.

LEHIGH COUNTY. The case of E. B. Kuhn, Heidelberg Township, pollution of Jordan Creek, was referred April 25th. Information was made but the case was withdrawn upon the payment of costs by the defendant on October 8th, as an abatement had been made.

The case of H. F. Smith, Heidelberg Township, pollution of Jordan Creek, was referred April 25th. Information was made but the case was withdrawn on September 24th, upon payment of the costs by defendant, as an abatement had been made.

The case of O. H. Peters, Heidelberg Township, pollution of Jordan Creek, was referred April 25th, and reported closed without litigation.

The case of J. B. Knerr, Coopersburg Borough, pollution of Saucon Creek, was referred May 9th, and reported closed without litigation.

The case of Emma Heanny, Coopersburg Borough, pollution of Saucon Creek, was referred May 9th, and reported closed without litigation.

The case of Daniel L. Egner, Coopersburg Borough, pollution of Saucon Creek, was referred May 9th, and reported closed without litigation.

The case of M. C. Fetter owner, J. C. Gray, tenant, West Bethlehem Borough pollution of Monocacy Creek, was referred May 28th, and remained open at the end of the year.

The case of Wayne Kline, owner, Edward Neumoyer, tenant, Upper Milford Township, pollution of Little Lehigh Creek, was referred May 28th, and was pending at the end of the year.

The case of A. O. Kisner, Upper Saucon Township, pollution of Saucon Creek, was referred November 19th, and was pending at the end of the year.

The cases of Cyperion Cressley and Jerry Peter, both of Lowell Township, for stream pollution, were referred November 19th, and remained open at the end of the year.

The case of Charles Shaeffer, Coopersburg Borough, pollution of Saucon Creek, was referred on November 19th, and reported closed December 10th, without litigation.

The case of William Boyer, owner, William Newhart, tenant, North Whitehall Township, stream pollution, was referred November 19th, and remained unabated at the end of the year.

The case of J. S. Cooper, owner, R. M. Cooper, tenant, Coopersburg Borough, pollution of Saucon Creek, was referred August 30th, and remained open at the end of the year.

The cases of H. P. Huffman and John Wetherold, both of North Whitehall Township, charged with a pollution of the Lehigh River, were referred November 17th, and were pending at the end of the year.

The case of Mark Engleman, Coopersburg Borough, pollution of Saucon Creek, was referred August 30th, and reported closed without litigation.

LYCOMING COUNTY. The case of Mrs. Pauline Crouse, Loyalsock Township, pollution of McClure's Run, was referred November 11th, and reported closed without litigation November 21st.

MONTGOMERY COUNTY. The case of J. M. Yocum, Springfield Township, nuisance arising from overflowing cesspool, at the Wheelpump Hotel, was referred in November, and was pending at the end of the year.

VENANGO COUNTY. The case of John Philips, Cornplanter Township, nuisance arising from garbage dump, was referred November 10th, and was pending at the end of the year.

WARREN COUNTY. The case of D. E. Lesser, Mead Township, stream pollution was referred January 11th, and reported closed without litigation February 6th.

WESTMORELAND COUNTY. The case of Louis Knetchel, Penn Township, nuisance arising from discharge of waste water to public road, was referred May 8th, and was reported closed November 7th, without litigation.

The case of Mount Pleasant Township School Board, stream pollution, was referred June 27th, and was reported closed without litigation.

The case of L. Steele, Allegheny Township, nuisance consisting of dead animals, etc., was referred August 4th, and was pending at the end of the year.

The case of Harris Brothers, Rostraver Township, nuisance arising from garbage dump was referred August 16th, and reported closed September 19th, without litigation.

YORK COUNTY. The case of John Smith, Shrewsbury Township, the pollution of a tributary of Codorus Creek, used as a water supply by Glen Rock Borough, was referred November 18th. Information was made on November 21st, and at the hearing on December 4th, the case was returned to the January, 1911, term of court.

The case of George H. Hartman, Newberry Township, nuisance, was referred September 26th, and reported closed December 3rd, without litigation.

VII.—CONCLUSIONS.

There are two propositions which encompass the entire scope of the administration of the law for the preservation of the purity of the waters of the State for the protection of the public health in so far as the discharge of the sewer systems is concerned and they are:

FIRST: The degree of safety which can be expected to be obtained in treating sewage for the removal of bacterial infection.

SECOND: The relative importance of sewage disposal plants and other health protective work, including treatment plants for water works, regarded in the light of the limited resources of the municipal corporations as defined by the constitutional limit of indebtedness and of private corporations, as determined by water rates fixed by franchise or contract with the municipality.

In settling these questions in any particular case a thorough consideration of all the factors must be had. Each case is a particular problem in itself. In Pennsylvania, owing to the variety of watersheds, geological formation and the development of natural resources each of which, to a greater or less degree characterizes the quality and quantity of the waters flowing from the watersheds, it is impracticable to adopt and promulgate any general standard for the guidance of local authorities and for experts employed by local authorities both with respect to water works systems and sewer systems and the quality of the waters which are the source of supply to the public. Some of the streams of Pennsylvania are given over absolutely as carriers of industrial wastes, particularly in the coal fields, where drainage from mines destroys all life in the waters. The highest courts of the Commonwealth and the Legislature have determined the rights of corporations in these districts. In preserving the purity of the waters of the State, each municipality or private corporation in what it does or wishes to do, has its own peculiar relationship to the problem. The policy of setting forth at length many of the reasons which govern determinations of the Commissioner of Health or the Govenor, Attorney General and Commissioner of Health, in the case of sewage disposal, has been continuous in the decrees issued to municipal and private corporations in order that the local authorities may better understand the entire subject as viewed by the State Department of Health. The publication of the decrees in the "Annual Report" is dispensed with for the first time this year. Engineers and others seeking information contained in the decrees can obtain the same by reference to the original copy, or to copies on file in the office of the Department.

Division of Supplies

Charles Hartzell, Superintendent

DIVISION OF SUPPLIES

CHARLES HARTZELL, Superintendent.

STAFF.

Miss F. M. Eckels, Stenographer, Cumberland Co.
Miss S. J. Riegel, Chief Clerk, Dauphin Co.
Miss E. C. Mailey, Clerk, Dauphin Co.
Geo. T. Lutz, Clerk, Perry Co.

This Division keeps in stock all supplies required by the Department and handles all express and freight matter. During the year 1910 seven thousand, two hundred and seventy-five (7,275) shipments were made by express alone, being a marked increase over previous years, as shown by the following table:

SHIPMENTS OF EXPRESS.

1907—July to December,	832
1908—January to June,	1824
1908—July to December,	2512
1909—January to June,	3376
1909—July to December,	3880
1910—January to June,	4313
1910—July to December,	2962

All requisitions for printed matter are made on the State Printer by this Division. Immediately upon receipt the various cards, circulars, pamphlets, etc., are counted and made up into packages of such quantities as are regularly furnished, in order to facilitate distribution to the sanatorium, dispensaries, officials and employees.

Outfits consisting of numerous printed forms, disinfectants, disinfecting suits and cans, are furnished to the sixty-six (66) County Medical Inspectors, six hundred and seventy (670) Department Health Officers and one hundred and fifteeen (115) State Tuberculosis Dispensaries. The disinfectants provided during the past year amounted to eleven hundred and forty-one (1,141) units. Forty-four (44) pounds formaldehyde, twenty-two (22) pounds permanganate and five (5) rolls gummed paper, compose a unit for this purpose.

Laboratory Outfits, No. 1—Blood test for malaria, No. 2—Widal test for typhoid fever, No. 3.—Sputum, urine, growths, etc., are assembled and forwarded upon request to approximately eight thousand (8,000) physicians in Pennsylvania. The valuable assistance which these outfits afford physicians is rapidly being recognized and the demand for them is accordingly increasing.

Boxes with bottles, for collecting samples of water from reservoirs, streams, etc., for bacteriological examination, are shipped daily to all parts of the State.

A large portion of the Department's mail matter is counted, folded, sealed, directed and stamped by this Division, as well as catalogues, schedules and mailing lists, made and corrected. The latter contain over twelve thousand (12,000) name and are rapidly growing.

Boards of Health and physicians in all parts of the world are supplied with publications of the Department.

Ten thousand (10,000) copies of each issue of the "Health Bulletin," published monthly by the Department, and two thousand (2,000) copies of the "Annual Report," are mailed to eminent officials, physicians and a great number of others who are interesed in official health work.

The amount of stock carried for the ten different Divisions is yearly increasing and it will shortly be very necessary for the Department to provide additional storage space.

Division of Accounting and Purchasing

E. I. Simpson, Accounting and Purchasing Agent

THE DIVISION OF ACCOUNTS

Fifth Annual Financial Report.

The Commissioner begs leave to respectfully report that under the three appropriations of the Legislature of 1907 and the appropriation of 1909, for the use of the several divisions of the Department, the following sums were received and expenditures made during the year of 1910.

Summary showing balances to December 31st, 1909, as per the fourth Annual Report of the Department.

APPROPRIATIONS.

Act No. 673: for the establishing and maintenance of Tuberculosis Dispensaries for two years ending May 31st, 1909,		$400,000 00
Total expenditures as per report to December 31st, 1907,	$8,810 82	
Total expenditures as per report to December 31st, 1908,	147,668 95	
Total expenditures as per report to December 31st, 1909,	223,649 98	380,129 75
Unexpended balance of Appropriation to January 1, 1910,		$19,870 25
Act No. 659: for the payment of salaries of the General Office, Medical Division, Laboratories, and Experimental Station, Division Distribution of Biological Products, Bureau of Vital Statistics, Bureau of Morbidity and Marriage Statistics, Sanitary Engineering Division, Division of Accounting and Purchasing, and Division of Supplies, to May 31st, 1911		$255,000 00
Total expenditures as per report to December 31, 1909,		73,541 63
Unexpended balance of Appropriation to January 1, 1910,		$181,458 37
And for the payment of the cost of diptheria antitoxin and other biological products for free distribution among the poor, for the employment of special and assistant engineers, stream and sanitary inspectors and such other employees as may be necessary, for the fees and necessary traveling expenses of the county medical inspectors and rural health officers, for the necessary traveling expenses of the Commissioner of Health, his assistants and other employees, for the maintenance of the Bureau of Vital and Morbidity Statistics, for the maintenance of Laboratories and experimental station, for the payment of the expenses of maintaining and nursing at the State Quarantine Station at Marcus Hook, Pa., persons taken from vessels who are suffering from or have been exposed to communicable diseases in cases regarded by the Commissioner of Health as cases of great emergency, and for the payment of all other necessary expenses of the Department in suppressing epidemics of diseases and protecting the public health in emergencies, to May 31st, 1911		$745,000 00
Total expenditures as per report to December 31, 1909,		154,721 94
Unepended balance of Appropriation to January 1, 1910,		$590,278 06

And for the acquiring of property, constructing, equipping and maintaining sanatoria, infirmaries and dispensaries for the free treatment of indigent persons affected with tuberculosis, and for the maintenance of laboratories, for sanitary supervision, isolation, education and treatment of indigent persons affected with tuberculosis, for the payment of salaries and for all other necessary expenses which may be incurred in this tuberculosis work, to May 31, 1911	$2,000,000 00
Total expenditures as per report to December 31, 1909	390,716 62
Unexpended balance of Appropriation to January 1, 1910,	$1,609,283 38

Act No. 355, Appropriation 1907, Polk Fund Amount set aside for this Department's share in this work	$5,000 00
Total ependitures as per report to December 31, 1909	3,563 54
Unexpended balance of Appropriation to January 1, 1910	$1,436 46

And that the Receipts and Expenditures from January 1st, 1910, to December 31, 1910, on account of the Dispensary Fund, Act No. 673, have been as follows:

Receipts.

Cash on had, January 1, 1910, as per report, for year ending December 31, 1909,	$19,870 25

Disbursements.

Proportion of Dispensary Building at Mont Alto and improvements for the Biological Immunity Treatment of Tuberculosis.		
On account one dispensary building, ten cottages, five pavillions, five toilet houses and one bath house	$19,336 36	
Miscellaneous expenses	84 72	
Total Disbursements from January 1, 1910, to December 31, 1910		$19,421 08
Cash on hand December 31, 1910,		449 17
		$19,870 25

NOTE:—The following amounts were paid to the Department:		
Interest on Bank balance, January, 1910,	$34 65	
Interest on Bank balance, February, 1910,	29 19	
Interest on Bank balance, March, 1910,	23 93	
Interest on Bank balance, April, 1910,	21 16	
Interest on Bank balance, May, 1910,	16 33	
Interest on Bank balance, June, 1910,	15 78	
Interest on Bank balance, July, 1910,	16 30	
Interest on Bank balance, August, 1910,	13 89	
Interest on Bank balance, September, 1910,	9 21	
Interest on Bank balance, October, 1910,	4 14	184 58
These were returned to State Treasurer on the following dates:		
April 22, 1910,	$87 77	
June 4; 1910,	16 33	
August 23, 1910,	32 08	
September 12, 1910,	13 89	
October 5, 1910,	9 21	
October 28, 1910,	21 16	
November 2, 1910,,	4 14	$184 58

SUMMARY.

Appropriation,		$400,000 00
Total expenditures as per report to December 31, 1907,	$8,810 82	
Total expenditures as per report to December 31, 1908,	147,668 95	
Total expenditures as per report to December 31, 1909,	223,649 98	
Total expenditures as per report to December 31, 1910,	19,421 08	399,550 53
Unexpended balance appropriation returned to State Treasurer .		449 17

And that the Receipts and Expenditures on account of the appropriation of 1909 from January 1, 1910,, to December 31, 1910, have been as follows:

GENERAL FUND, ACT NO. 659, ITEM NO. 1.

Receipts.

The Auditor General issued warrants on account general salaries as follows:		
January 28,	$9,791 65	
February 9,	9,791 65	
March 31,	9,791 74	
April 23,	9,791 62	
April 26,	2,500 00	
May 31,	9,791 65	
June 1,	2,500 00	
June 30,	9,791 74	
July 30,	9,791 60	
August 24,	9,583 32	
September 23,	9,583 40	
October 4,	2,500 00	
October 18,	9,601 60	
November 8,	9,666 65	
November 19,	2,500 00	
December 7,	9,666 74	
December 20,	833 34	$127,476 70

Disbursements.

Salaries paid by State Treasurer:		
General Office salaries,	$12,460 00	
Medical Division salaries,	12,783 34	
Laboratory and Experimental Station salaries,	10,280 00	
Division Biological Products salaries,	5,440 00	
Bureau of Vital Statistics salaries,	14,800 00	
Bureau Morbidity and Marriage Statistics salaries,	5,800 00	
Sanitary Engineering Division salaries,	36,920 00	
Division Supplies salaries,	4,040 01	
Commissioners salary,	10,833 34	
Division Accounts and Purchasing salaries,	14,120 01	$127,476 70

SUMMARY.

Appropriation,		$255,000 00
Expenditures from June 1, 1909, to December 31, 1909,	$73,541 63	
Expenditures from January 1, 1910 to December 31, 1910,	127,476 70	201,018 33
Unexpended balance appropriation, January 1, 1911,		$53,981 67

GENERAL FUND, ACT NO. 659, ITEM NO. 2.

Receipts.

Cash on hand, January 1, 1910 as per report to December 31, 1909,		$31,528 02
Received from the Auditor General warrants on account as follows:		
January 14,	$31,041 66	
February 28,	31,041 66	
March 14,	31,041 66	
April, 14,	31,041 66	
May 4,	31,041 66	
May 26,	31,041 66	
June 20,	31,041 66	
July 14,	31,041 66	
August 26,	31,041 66	
August 31,	31,041 66	
October 17,	31,041 66	
November 15,	31,041 66	
December 30,	31,041 66	
December 30,	31,041 66	403,541 58
		$435,069 60

Disbursements.

Medical Division.

Expenses Health Officers and County Medical Inspectors, on account correspondence, reports, inspecting, quarantining and disinfecting the following diseases.	
Scarlet fever,	$21,086 49
Small Pox inspection,	9,720 96
Measles and Mumps,	51,171 32
Diphtheria,	35,147 77
Typhoid fever,	22,292 82
Pneumonia,	612 77
Vaccination,	263 49
Chickenpox,	6,398 98
Whooping cough,	7,552 95
Erysipelas,	739 02
Hydrophobia,	3 00
Tuberculosis,	2,740 51
Malarial fever,	13 59
Tetanus,	744 51
Cerebrospinal meningitis,	277 88
Tonsilitis,	60 58
Asiatic Cholera,	378 68
Dysentery,	53 13
Scabies,	117 66
Cancer,	16 64
Impetigo Contagiosa,	50 62
Scrofula,	3 23
Infantile Paralysis,	349 57
Miscellaneous Expenditures:	
Disinfectants,	7,766 82
Expenses instructing and appointing health officers,	6,751 19
Laboratory,	8,151 29
Nuisance inspection,	26,920 54
Legal services,	2,337 27

GENERAL FUND, ACT NO. 659, ITEM NO. 2, (Continued).

General Sanitary inspection,	276 15	
Educational matter,	1,790 14	
Advertising rules and regulations,	80 07	
Freight and drayage on supplies, disinfectants, &c.,	3,623 58	
Convention County Medical Inspectors,	45 55	
Sanitary Inspection Schools,	14,167 88	
Establishing local Boards of Health,	323 32	
Filing Blanket Affidavits by Health Officers and County Medical Inspectors,	26 15	$232,056 12

Disbursements.

Engineering Division.

Engineers' salaries,	$13,263 33	
Inspectors salaries,	64,396 34	
Pure Water inspection,	56,337 17	
Account Cresson Infirmary Site,	1,983 30	
Account Hamburg Infirmary Site,	152 24	
Account Railroad Mont Alto,	152 07	$136,284 45

Division Vital, Morbidity and Marriage Statistics.

Account of Vital Statistics,	$1,261 41	
Account Morbidity and Marriage Statistics,	2,217 51	$3,478 92

General Expenses.

Cleaning office, janitor services, etc.,	$1,012 17	
Postage,	12,188 85	
Clerical salaries,	14,744 35	
Office expenses,	3,352 65	
Commissioner's Traveling expenses,	428 28	
Engrossing Commissions,	70 00	
Secretary to Commissioner, traveling expenses,	158 48	
General expenses,	445 67	$32,400 45
		$404,219 94
Cash on hand January 1, 1911,		$30,849 66
		$435,069 60

SUMMARY.

Appropriation,		$745,000 00
Expenditures from June 1, 1909, to December 31, 1909,	$154,721 94	
Expenditures from January 1, 1910, to December 31, 1910,	404,219 94	558,941 88
Unexpended balance appropriation January 1, 1911,		$186,058 12

NOTE: The following amount were received by the Department:

January 1st, Interest on Bank Balance,	267 65	
June 1st, Interest on Bank Balance,	325 06	
June 30th, Fees for certified copies records births and deaths,	810 00	
November 2nd, returned from State Asylum for Insane at So. Mountain,	48 21	
December 3rd, Interest on Bank Balance,	267 46	$1,718 38
		$1,718 38

These were returned to State Treasurer on the following dates:

March 31st,	267 65	
June 30th,	810 00	
July 20th,	325 06	
November 3rd,	48 21	
December 5th,	267 46	$1,718 38
		$1,718 38

TUBERCULOSIS FUND, ACT NO. 659, ITEM NO. 3.

Receipts.

Cash on hand January 1st, 1910,		$25,950 03
Received from Auditor General Warrants on account as follows:		
January 11th,	$83,333 33	
February 9th,	83,333 33	
March 15th,	83,333 33	
April 15th,	83,333 33	
May 17th,	83,333 33	
June 30th,	83,333 33	
July 31st,	81,333 33	
August 25th,	85,333 33	
September 26th,	83,333 33	
October 20th,	83,333 33	
November 16th,	83,333 33	
December 1st,	83,333 33	
December 31st,	20,000 00	$1,019,999 96
Total receipts,		$1,045,949 99

Disbursements account Mount Alto Sanatorium.

Maintenance:		
Nurses' Salaries,	$18,728 43	
Miscellaneous Salaries account maintenance,	45,326 04	
Doctors' Salaries,	11,301 11	
Domestic Salaries,	1,900 00	
Drugs,	2,038 91	
Operating expense,	38,320 54	
Traveling Expenses account maintenance,	557 96	
Food Stuffs,	80,160 82	
Insurance,	4,314 91	
Legal Services,	13 41	
Advertising rules and regulations,	830 34	
Milk and Eggs,	79,908 82	
Postage,	483 00	
Disinfectants,	662 79	
Educational Matter,	140 00	
Salad Oil,	64 00	$284,751 08

Miscellaneous Accounts:		
Furnishings,	$14,811 03	
Operating Supplies,	22,511 98	
Building Supplies,	3,382 97	
Freight and Drayage,	3,755 72	
For relief map Mont Alto,	300 00	$44,761 70
Expenditures account Permanent Improvements:		
Fire Extinguishers,	$321 35	
Acetylene Gas Generators,	41 36	
Laboratory, Morgue, Chicken House, Stables, etc.,	751 76	
Heating and Fire Pipes for Dining and Infirmary, Building,	50 00	
Filter Plant, Carpenter Shop and Septic Tanks,	402 58	
Acetylene Gas Lighting Fixtures,	319 11	
Garbage Disposal Plant,	1,714 00	
Miscellaneous Salaries on account permanent improvements,	34,753 79	
Drilled Wells,	1,987 60	
New Road,	846 27	
New Fire Line,	36 73	
Central Heating Plant,	39,940 74	
Nurses and Physicians Buildings at Camp and Infirmary, one Children's Building, Fifteen Cottages, one Pavilian, moving three pavilions, and one Toilet House and making alterations and additions to Infirmary, Dining Building and Laundry,	103,646 87	
Traveling Expenses account permanent improvement,	72 30	
Heating apparatus for Dispensary Building,	3,285 74	
Dispensary Building, One Bath House, Fifteen Cottages, three Toilet houses,	1,024 90	
Water Works system,	15,948 25	
Additional Land at Mont Alto,	300 00	
Salary of Superintendent from State Board Grounds and Buildings,	367 08	$205,810 43
(Total expenditures account Mont Alto, from January 1, 1910, to December 31, 1910)		$535,323 21

Disbursements, Dispensaries Account.

Maintenance:		
Nurses' Salaries,	$78,794 41	
Doctors' Salaries,	83,854 91	
Drugs,	3,535 11	
Milk and Eggs,	177,223 45	
Clerical Salary,	17,021 86	
Operating Expenses,	9,280 51	
Traveling Expenses, doctors and nurses	13,572 70	
Freight and cartage,	384 58	
Rent,	24,816 44	
Domestic Salaries,	7,356 51	
Office Expenses,	755 82	
Disinfectants,	1,485 09	
Educational Matter,	25 25	
Laboratory,	11 90	
Advertising,	2 60	
Postage,	550 24	
Tubercular Bacilli,	6,024 69	
Salad Oil,	1,730 85	$426,426 92

Miscellaneous Expenses:			
Traveling Tuberculosis Exhibit,	$5,390 34		
Convention of Chiefs of Dispensaries,	721 85		
Engrossing Commissions,	28 70		
Operating Supplies,	2,239 22		
Furnishings,	3,763 10	$12,143 21	
		$438,570 13	
(Total expenditures account Dispensaries from January 1, 1910, to December 31, 1910,			$438,570 13

DISBURSEMENT, ACCOUNT CRESSON SANATORIUM.

Clearing tract, original survey, etc.,	$4,278 38		
Advertising,	151 31		
Taxes for year 1909,	113 80		
Legal services,	218 90		
Educational Matter,	15 70		
Repairs and Furnishings for Jones Cottage,	449 30		
Freight and drayage,	175 53		
Clerical Salaries,	70 28		
Domestic Salaries,	57 53		
Traveling expense account construction,	676 45		
Miscellaneous salaries account construction,	31 00		
Macadam Roadway,	3,424 41		
Chicken House,	1,469 29		
Building Supplies,	1,608 51		
Pump House,	23 53		
Drilled Wells,	875 26		
Electric Light Plant,	22 11		
Blacksmith shop,	125 31		
Water Supply,	912 93		
Sewerage System,	16 35		
Dining Room Building, and Connecting Corridors, Administration Building, East Ward Building, Power and Laundry Building,	13,226 26		
Operating expenses,	243 33		
Office Expense,	1 72	$28,187 19	
		$28.187 19	
(Total expenditures account Cresson from January 1, 1910, to December 31, 1910),			$28.187 19

DISBURSEMENT, ACCOUNT HAMBURG SANATORIUM.

On account clearing tract, original survey, etc.,	$274 69		
Purchase Hamburg Land,	18,920 34		
Engineers' Traveling Expenses,	305 41		
Building Supplies,	3 57		
Legal Services,	225 00	$19,729 01	
(Total expenditures account Hamburg from January 1, 1910, to December 31, 1910),			$19,720 01

Total expenditures account Tuberculosis Fund from January 1, 1910, to December 31, 1910,	$1,021,809 54
Cash on hand, January 1st, 1911,	24,140 45
	$1,045,949 99

TUBERCULOSIS FUND, ACT NO. 659, ITEM NO. 3 (Continued).

SUMMARY.

Appropriation,		$2,000,000 00
Expenditure from June 1, 1909, to December 31, 1909,	$390,716 62	
Expenditure from January 1, 1910, to December 31, 1910,	1,021,809 54	1,412,526 16
Unexpended balance appropriation Jan. 1, 1911,		$587,473 84

NOTE: The following amounts were received by the Department:

January 25th, Interest on Bank Balance,	$518 58	
June 15th, Interest on Bank Balance,	917 67	
December 27th, Interest on Bank Balance,	699 85	$2,136 10

These were returned to State Treasurer on the following dates:

April 13th,	$518 58	
July 20th,	917 67	
December 29th,	699 85	$2,136 10

POLK FUND.

And that the receipts and expenditures on account of the Polk Fund from January 1st to December 31st, 1910, have been as follows:

Cash on hand, January 1st, 1910,	$1,436 46

Disbursements.

Expenditures preparing plans and surveys from from January 1st, 1910, to January 1st, 1911,	$349 13	
Expenditures on account general supervision January 1st, 1910, to January 1st, 1911,..	804 20	
		1,153 33
Unexpended balance on hand, January 1, 1911,		$283 13

NOTE—The following amounts have been received by the Department on account this fund:

Balance interest on hand, January 1st, 1910, ..	$81 26	
June 15th, interest on bank balance,	11 44	
December 15th, interest on bank balance,	4 98	
		97 68

These were returned to State Treasurer as follows:

December 31st, 1910,	97 68

ERRATA

Note. This annual report was already partly in type when the health of the late Dr. Benjamin Lee became so much broken that he was no longer able to give his usual care to editorial supervision and the reading of proof. Then came a fire in the printery which much delayed the completion of the book. Later, when the “dummy” was finally at hand and an index nearly half done, a *second fire came*, with far more serious results. Everything was ruined with the exception of a number of the explanatory charts. It became necessary to reset the text, using the dummy as copy, and print anew; and this was done without a proper opportunity for proof-reading and correction. The outcome leaves much to be desired. Some of the most serious slips are noted below.

P. 6. Compare the staff of the Medical Division with the changes given on p. 66.
P. 7. For Carbon County the C. M. I should be Dr. Edward G. Bray.
Under Huntingdon County, for “Foutz” read “Frontz.”
Under Lebanon County, for “Reigel” read ‘Riegel.”
P. 14. The last nine Health Officers of Northampton County should be accredited to Northumberland.
P. 17. Compare this list with the staff changes noted on p. 437.
P. 18. Compare this staff list with the information of p. 372.
P. 24. Under Lebanon County, for “Reigel” read “Riegel.”
P. 26. Under Union County, for “Mifflintown” read “Mifflinburg.”
P. 38. Insert: “Charles A. Emerson, Jr., Principal Assistant Engineer in charge of Design and Construction,” and further correct the staff list by comparison with the report (p. 897).
line 21. Let it read “Abner H. Beard.”
P. 65. Add an “Inspection at Tower City concerning Scarlet Fever,” and “Investigations of Scarlet Fever in Wiconisco and Lykens, B. Franklin Royer.”
P. 66. Under Diphtheria, add “Waynesboro, Franklin County, B. Franklin Royer.”
P. 199, line 15. For “McGuown” read “McKown.”
P. 295, line 2. For “under 1 month” read “under 1 year.”
lines 12, 15. For “Dickinson City” read “Dickson City.”
P. 301, line 10. The spot map of Pottsville is omitted.
P. 313, line 21. Omit the first sentence of this paragraph. The sketch was withdrawn.
P. 314, lines 4, 7 from below. Let it read “Mahaffey.”
P. 321. Strike out the second and third lines from the bottom.
P. 334, line 29. For technical reasons the plan was omitted without a correction of the text.
P. 354. In the title let it read “Lime Ridge.”
P. 360, line 9 etc. The name of Mr. Low is Myron I.
P. 374, line 9. This paragraph should refer to the last two symbols in the first column of p. 373.
P. 398, line 32. For “Mcard” read “Beard.”
line 16 from below. For “quarters” read “quarts.”
P. 437, line 16. For “Dr. Damaso” read “Dr. Damaso Rivas.”
P. 457, lines 13, 17, 18. For “antrium” read “atrium,” and in line 15, let “mucaso” read “mucosa.”
P. 513, line 5 from below. For “straning” read “staining.”
P. 516, lines 7, 11. For HCI read HCl. Other chemical curiosities in this report are due to the difficulty of reproducing a formula on the ordinary typewriter.

P. 580. 581. Mistakes in these tabulations were discovered when the printing of the report was too far advanced to permit the necessary changes here and in the various summaries. The corrected tables will be found in the report for 1911.

P. 623, line 4. Add "Pittsburgh."

P. 920, 3d list, No. 5, and P. 929, No. 275. Let it read "S. Middleton Twp."

P. 932, 2d col., No. 151. Let it read "Warren Water Co."

P. 949, No. 228. "Three sewer companies" belongs to Sunbury.

P. 1005, No. 7. Let it read "Dermady Sanatorium."

P. 1081. The paging has been so much changed in reprinting that the numbers given here are variably wrong. The Introduction is on p. 1084; Part I is on p. 1085; Part II is on p. 1114; Part III is on p. 1127; Part IV is on p. 1135; Part V is on p. 1212; Part VI is on p. 1220.

P. 1093, line 9 from below. For "lapse" read "elapse."

P. 1278, line 26. Strike out "hypo."

P. 1287, line 17. For "hatchery" read "batchery."

P. 1328, the lower take is misplaced; it is a continuation of p. 1327.

P. 1330. Before line 14 from below, insert: "Connellsville is a borough of about 12,800 population, principally located on"
line 4, from below. This line should be the last line of the page.

P. 1332, line 14 from below. Strike out the sentence: "This part * * * * * * * * tributaries."

P. 1369, line 5, from below. For "Council" read "Counsel."

INDEX

Page.
Abbott, Dr. deB., Dispensary Physician, 22
Abdomen, Abdominal, (cf. Intestines): Abdominal Tuberculosis, as a cause of death, 613,658,676,715,724
Abington Twp., Water Supply, 918
Abscess, Acute, as a cause of death, 667,685,719,729
Abscess, Urinary, as a cause of death, (cf. Urinary passages), 666,684,719,728
Abstracts of reports of C. M. I. on communicable diseases, etc., 85
Accident as a cause of death (cf. External causes; violent deaths), 670,688,721,730
Accounting, Division of, etc., 42,1379
Acid and iron waste disposal, 991
Actinomycosis (cf. Mycoses), Morbidity (1906-1910), 869
Adams County, abstracts of reports of C. M. I., 85,201
  summary of monthly reports of Health Officers, 204
  report of dairy inspections, 207,210,212
  Boards of Health, 221
  County Medical Inspector, 7
  Township Health Officers, 8
  Tuberculosis Dispensary, 22
  Marriages, 884
  rate (1906-1910), 887
  rural births, 767,791,818,843,861
  rural mortality, 653,694,705,711,740
  tuberculosis, rural mortality rate for five years, 620
Addison's disease, as a cause of death, 660,678,715,725
Addresses, 56
Address before the Yough Valley Medical Society, 244
Adenoids, removal in patients of certain dispensaries, 407,409
Adrenal disease (cf. Addison's disease)
Advisory Board, 4,42
Age, as a cause of death (cf. Infancy, Old Age)
Age of patients of the Dispensaries, 413
  of patients discharged from Mont Alto Sanatorium, 367,378,387,390,395
  research on its influence on cultures of tubercle bacilli, 524
  research on the change produced in tubercle bacillus extract No. 10, 519
Age and marriage, 883,888
  maternity, 752,774
  morbidity, 874,880
  mortality, 605,608-613,656,732,735,743,746,750
  infant mortality under two, by days, weeks, months, 624,630,636,642
Air space disinfected, Report of Health Officers, 204
Alba (Bradford), Board of Health reorganized, 222
Albion, Water Works, (permit, sources), 918,934
Albion Water Co., Water Works (permit, sources), 918,935,938
Albuminuria (cf. Nephritis, etc.)
Albuminuria, Puerperal, as a cause of death, 667,685,719,728
Alcoholism, as a cause of death, 660,678,716,725
Aldan, Water Supply, 918
Alden (Newport Twp.), Water supply, 1112
Alexander, Dr. I. H., Dispensary Physician, 22
Aliquippa, Sewerage, permits, etc., 910,943,950,954

Page.

- Allegheny County, County Medical Inspector, 7
  - Township Health Officers, 8
  - abstract of reports of C. M. I. on communicable diseases, etc., 86,201
  - summary of reports of Health Officers, 204
  - dairy inspection, 207,210,212
  - Boards of Health, 221
  - tuberculosis dispensaries, 22
  - tuberculosis mortality, 617,618,620
  - poliomyelitis, 282,294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 767,792,818,843,861
  - rural mortality, 653,694,705,711,740
  - work house, O'Hara Twp., sewage disposal plant (permits, etc.), 915,943,951,1005,1006
- Allegheny City Home, O'Hara Twp., Sewage disposal plant (permits, etc.), 916,943,951,1005,1006
- Allegheny River watershed, sanitary survey, 1007
- Allegheny Valley Water Co., purification plant and operation 998,1001
- Alleman, Dr. H. M., Dispensary Physician, 27
- Allentown, Tuberculosis Dispensary, 24
  - births, 753,774,800,826,852
  - mortality, 649,692,697,702,708,723,738
  - tuberculosis mortality, 616,619
  - typhoid death rate, 606
  - poliomyelitis (and spot map), 284
  - sewerage permits, etc., 943,950,951,952
- Allison, Dr. L. D., dispensary physician, 22
- Almedia (Scott Twp.), typhoid fever, 1277
- Altman, Dr. O. R., C. M. I. for Fayette Co., 7
  - abstract of report, 138
  - dispensary physician, 24
- Altoona, tuberculosis dispensary, 22
  - births, 753,774,800,826,852
  - mortality, 649,692,697,702,708,723,738
  - tuberculosis mortality rates for five years, 619
  - typhoid death rate, 606
  - sewage disposal plant, 915,1005
- Alum, use in purification plants for public water supplies, 999
  - in the plant of the Connellsville Water Co., 1333,1334
  - use at York filtration plant investigated, 993
- Alwine, Jerry, Water Works, (permits, sources), 918,934
- Ambridge, birth statistics, 753,775,801,826,852
  - mortality, 649
- American Association for the Study and Prevention of Infant Mortality, Department represented at meeting, 59
- American Medical Association, Department represented at the annual meeting, 57
- American Medical Association, report thereon, 269
- American Public Health Association, Department represented at the annual meeting, 58
- American Sheet and Tin Plate Co., waste disposal investigated, 991
- American Steel and Wire Co., sewerage permits, 943,954
- Amœbic dysentery, reputed outbreak in Chester, (cf. Chester)
- Amputation as a cause of death, 668
- Anaemia, chlorosis, as a cause of death, 660,678,715,725
- Analytical methods of the water purification plants, 993,999
- Aneurysm, (cf. Arteries).
- Angina pectoris, as a cause of death, 662,680,717,726
- Angle, Dr. W. L., C. M. I. for Monroe County, 7
  - abstract of report, 166
  - dispensary physician, 25
- Animals, dead, as nuisances, petitions and complaints, 903
  - injury by, as a cause of death, 671,689,721,731
  - paralyses during the epidemics of poliomyelitis, 459,476

Page.
Ankylostomiasis (cf. Uncinariasis); as a cause of death, ... 665
Annville (cf. N. and S. Annville Twps.): Water Supply, ... 918
Annville Water Co., water works, (permit and sources), ... 918,934
Anterior Poliomyelitis (cf. Poliomyelitis).
Anthrax (cf. Bacillus *anthracis*) morbidity, ... 869,870
mortality, ...657,675,715,723
Antitoxin, diphtheria, distributors, ... 28
distribution and use, ... 55,530
tetanus, distributors, ... 594
distribution and use, ... 55,593
Apollo, Water supply, ... 995,999
Apollo Water Works Co., operation of plant, ...913,995,999
Apoplexy, (cf. Cerebral hemorrhage).
Appendicitis (and typhlitis), as cause of death, ...665,683,708,718,727
Appropriations, ... 1380
Archbald—Birth statistics, ...753,775,801,827,852
mortality by months, ... 649
Architect (cf. Landscape architect).
Arendtsville, Water supply, ... 918
Arendtsville Water Co., water works (permit and sources), ... 918,936
Arment, Dr. S. B., C. M. I. for Columbia Co., ... 7
abstract of report, ... 123
dispensary physician, ... 23
special report on typhoid fever at Lime Ridge and Espy, ... 354
Armstrong County, C. M. I., ... 7
Township Health Officers, ... 8
abstract of report of C. M. I. on communicable diseases, etc., ... 87,201
summary of reports of health officers, ... 204
report of dairy inspection, ...207,210,212
Boards of Health, ... 221
tuberculosis dispensary, ... 22
tuberculosis mortality rates for five years, .. 620
poliomyelitis, ... 294
marriages, ... 884
rate (1906-1910), ... 887
Rural births, ...767,792,818,844,861
rural mortality, ...653,694,705,711,740
Armstrong Water Co., purification plant and operation, ... 996,1000
Arnold, Dr. W. A., dispensary physician, ... 22
Arnold, no Board of Health, ... 230
Arteries, disease of (Atheroma, Aneurysm, etc.), as a cause of death, ...662,680,717,726
Ashcraft, Dr. E. H., C. M. I. for Potter Co., ... 7
abstract of report, ... 173
dispensary physician, ... 26
Ashland, birth statistics, ...753,775,801,827,852
mortality, ... 649
Ashley, birth statistics, ...754,775,801,827,852
mortality, ... 649
water supply, ...1087,1107
typhoid fever, ...1115,1212
good Board of Health, ... 1218
Asphyxia by deleterious gases (conflagration excepted), as a cause of death, ...670,688,721,730
Asphyxia, suicidal, mortality, ...669,687,720,729
Aspinwall-Delafield Co., sewerage permits, etc., ...943,950,953
Assistant to Commissioner, Dr. Benjamin Lee, ... 6
Associate chief medical inspector (cf. Dr. B. Franklin Royer and Dr. C. J. Hunt, 8).
Associations, (cf. American Association for the Study and Prevention of Infant Mortality; American Medical Association; American Public Health Association; National Association for the Study and Prevention of Tuberculosis).
Asthma, as a cause of death, ...664,682,717,727

Page.

Ataxia, see under Locomotor.
Atglen, sanitary conditions investigated, 218
Athens, Water Supply, 914,918,997,1001
Atheroma, (cf. Arteries, diseases of)
Attorneys, acting for the department in the final adjustment of cases relating to pollutions and nuisances, 1370
Auditor, Miss Ivy Huber, 6
Austin, Water Works (permits, sources), 918,934
Austin Heights (Old Forge), water supply, 1096
Automobile, accident or injury, as a cause of death (cf. traumatism), 671,685,721,730
Avalon, Water Supply, 918
Avella, outbreak of typhoid fever, report of the engineering division, 1285
Avoca (formerly Pleasant Valley), status of Board of Health, 227,1213,1214
    Water supply, 1086,1091
    sewerage (permits, etc.), 943,950,954
    typhoid fever, 1115,1212
Avoca Borough Water Co., 1086
Avondale (Plymouth Twp.), water supply, 1112
Avonmore, Water Works (permit, sources), 918,934

Babies (cf. Infants); Leaflet on baby saving, 47
Bacillus *anthracis*, presence in flestings of hides, 447,520
    experiments on destruction of, 1006
    research on the effect of mine waste water and tan wastes on, 447,521
Bacillus, Boas-Oppler, value in laboratory examinations for Carcinoma ventriculi, 441
Bacillus *coli communis*, study of the germicidal action of tan wastes and mine water, 521
Bacillus *diphtheriae*, Laboratory examinations for, 438,446
Bacillus *paracoli*, in the epidemic at Chester, 236,525
Bacillus *tuberculosis* (cf. tubercle bacilli products, wax), degreasing, 514
    granules under various conditions, 515,517
    study of staining properties when degreased, 447,513
    in tuberculous abscesses, 517
    study of the morphological variations in a tuberculous abscess, 447,517
    research concerning the effect of injection into the blood stream of cows and its appearance in the milk, 447,455
    research on its viability in sewage and water, 447,453
Bacillus *typhosus*, in the faeces, 446
Bacteriological findings, in the epidemic at Chester, 524
Bacteriological examinations, Frequency of, in the water purification plants, 993,999
Bacteriologists, 17,18,372,437
Bacteriology, (cf. Division of Laboratories, etc.)
Baden, water works (permit, sources), 918,934
    sewerage permits, etc., 943,950,955
Bald Eagle Water Co., water works (permit, sources), 918,935
Baldwin Township (cf. W. Liberty Improvement Co.), sewerage permits, 943
Ball, Dr. M. V., C. M. I. for Warren County, 7
    abstract of report, 191
    dispensary physician, 26
Bangor, tuberculosis dispensary, 25
    birth statistics, 754,775,801,827,852
    mortality, 649
Banks, Dr. W. H., C. M. I. for Juniata County, 7
    abstract of report, 149
    dispensary physician, 24
Barnesboro, Water supply, 918

Page.
Barnesboro sewerage permits, ... 943,955
Barnesboro Water Co., Water works, (permit, sources), ... 918,935
Basedow's disease (cf. Goitre),
Bashore, Dr. Harvey B., C. M. I. for Cumberland County, ... 7
    abstract of report, ... 127
    dispensary physician, ... 23
Bastards, urban and rural, and by maternal nativity, ... 852
Bath, sewerage permits, ... 943,954
Batt, Dr. Wilmer R., State Registrar and Supervisor of Morbidity and Marriage Statistics, ... 41
    Reports on Statistics, ...603,752,869,883
    represents the Commissioner at the annual meeting of the American Medical Association, ... 57
    at Conferences of State and Provincial Boards of Health, ... 57
    at the meeting of the American Association for the Study and Prevention of Infant Mortality, ... 59
    at the meeting of the American Public Health Association, ... 58
Bausch, Dr. F. C., Dispensary Physician, ... 24
Beallsville, No Board of Health, ... 229
Beard, Abner H., Assistant Engineer, ...38,898,900
Beaver County, County Medical Inspector, ... 7,66
    Township Health Officers, ... 8
    abstract of report of C. M. I. on communicable diseases, etc., ... 94,201
    summary of reports of Health Officers, ... 204
    report of dairy inspections, ...207,210,212
    Boards of Health, ... 222
    tuberculosis dispensaries, ... 22
    tuberculosis mortality rates for five years, ... 620
    poliomyelitis, ... 294
    marriages, ... 884
    rate (1906-1910), ... 887
    rural births, ...767,792,818,844,861
    rural mortality, ...653,694,705,711,740
Beaver, sewerage permits, plans, ...943,950,954
Beaver Creek Water Co., plant (permits, sources, operation, etc., 911,913,918,935,938,992,995,999
Beaver Falls, tuberculosis dispensary, ... 22
    birth statistics, ...754,775,801,827,852
    mortality, ...649,692,697,702,708,738
    tuberculosis mortality, ... 616,619
    typhoid death rates, ... 606
    sewerage permits, etc., ... 944,952
Beaver Valley towns, Water Supply, ... 995,999
Beaver Valley Water Co., purification plants, ...992,995,999
Bechtelsville (Berks Co.), no Board of Health, ... 222
Bedford County, County Medical Inspector, ... 7
    Township Health Officers, ... 8
    abstract of report of C. M. I. on communicable diseases, etc., ... 95,201
    summary of reports of Health Officers, ... 204
    report of dairy inspection, ...207,210,212
    Boards of Health, ... 222
    tuberculosis dispensary, ... 22
    tuberculosis mortality rates for five years, ... 620
    poliomyelitis, ... 294
    marriages, ... 884
    rate (1906-1910), ... 887
    rural births, ...767,792,818,844,861
    rural mortality, ...653,694,705,711,740
Bedford, sewerage permits, etc., ...943,950,954
Beechwood Park Amusement Co., sewerage permits, ets., ... 943,951

Page.

- Bellefonte, tuberculosis dispensary, 23
  - sewerage permits, etc., 943,952
- Bellevernon, sewerage permits, etc., 943,955
- Bellevue (Allegheny), birth statistics, 754,775,801,827,852
  - mortality, 649
  - water supply, 918
  - sewerage permits, etc., 943,950,955
- Bellevue (Scranton), Water supply, 1086,1095
- Bellevue Water Co., 1086
- Ben Avon, no Board of Health, 221
  - Water supply, 918
  - sewerage permits, etc., 943,950,954
- Bennett, Dr. C. E., Dispensary Physician, 25
- Bennett, Dr. J. H., Dispensary Physician, 27
- Bens Creek Water Co., water works (permit, sources), 918,935
- Bensalem Township, Water Supply, 918
- Bentleyville, typhoid fever, 1079
- Beriberi, as a cause of death, 658
- Berks County, County Medical Inspector, 7
  - Township Health Officers, 8,9
  - abstracts of reports of C. M. I. on communicable diseases, etc, 95,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 222
  - tuberculosis dispensary, 22
  - tuberculosis mortality, 617
  - rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,792,819,844,862
  - rural mortality, 653,695,705,711,740
  - atlas completed, 907
- Berlin, no Board of Health, 228
- Berry, Dr. John, physician to Mont Alto Sanatorium, 372
- Bertolet, Dr. Walter M., dispensary physician, 22
- Berwick, tuberculosis dispensary, 23
  - birth statistics, 754,775,801,827,852
  - mortality by months, 649
  - typhoid fever, 356
  - Water supply, 919
  - investigation concerning typhoid fever, report of the Engineering Division, 1223
  - typhoid fever morbidity, (1906-1910), 1225
  - typhoid fever (possible connection with the Lime Ridge epidemic), 1275,1276
- Berwick Water Co., water works (permits, sources, etc.), 911,918,936
- Bessemer, smallpox, 243
- Bethlehem, birth statistics, 754,775,801,827,852
  - mortality, 649,692,697,702,708,738
  - typhoid death rate, 606
  - poliomyelitis (and spot map), 272,275,284
  - water works (permits, sources), 918,934
- Bethlehem City Water Co., purification plant and operation, 992,997,1001
- Biddle, Dr. P. G., dispensary physician, 26
- Big Beaver Township, sewerage permits, 943
- Big Run, No Board of Health, 226
  - Water supply, 918,997,1001
  - Sewerage permits, etc., 943,952
- Bigler, typhoid fever, 1326
- Bigler Township, Water supply, 918
- Biglerville Water Co., Water Works (permit, sources), 918,934
- Bille ducts, Hepatic, effect of products of tubercle bacillus, 452
- Biliary calculi (cf. Calculi).

Page.

- Biological products, Division of Distribution of, 28
  - report, 527
- Birdsall, Dr. Samuel, dispensary physician, 26
- Birmingham, no Board of Health; difficulties, 146
- Birth, Premature, (cf. Pregnancy, as a cause of death of children, 668,720,729
  - by days, weeks, months (in children under two), 624,630,636,642
- Birth statistics, 54,752-865
- Bittinger, Dr. J. H., dispensary physician, 27
- Black Lick Township, Water supply, 918
- Blackwood Water Co., water works (permit, sources), 918,936
- Bladder, disease of the, as a cause of death, 666,684,719,728
- Blain, Board of Health, 172,228
- Blair County, County Medical Inspector, 7
  - Township Health Officers, 9
  - abstracts of reports of C. M. I. on communicable diseases, etc., 100,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - Notes on Boards of Health, 222
  - tuberculosis dispensaries, 22
  - mortality rates for five years, 620
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,792,818,844,861
  - rural mortality, 653,695,705,711,740
- Blairsville, sewerage permits, etc., 944,955
- Blakely, birth statistics, 754,775,801,827,853
  - mortality by months, 649
  - sewerage permits, etc., 944,950,954
- Blandburg Water Co. (Reade Twp.), Water Works (permit, sources), 918,935
- Blood, laboratory examinations (Malaria, Widal), 438
- Blood and blood cultures in poliomyelitis, 462,478
- Bloomfield Water and Sewer Co., water works, (permit, sources), 918,934
- Blooming Valley, no Board of Health, 224
- Bloomsburg, tuberculosis dispensary, 23
  - birth statistics, 754,776,802,827,853
  - mortality by months, 649
  - typhoid fever, 1275
  - sewerage permits, etc., 944,952
- Blose, Dr. D. P., dispensary physician, 22
- Blossburg, water supply, 918
- Blossburg Water Co., water works (permits, sources), 918,935
- Blue Ridge Water supply Co., water works (permit, sources), 918,934
- Boalsburg, water supply, 919
- Boalsburg Water Co., water works, (permits, sources), 919,935
- Boards of Health, conferences of State and Provincial of North America, department represented, 57
  - notes on, by counties, report of the Special Medical Inspector, 221
  - various memoranda concerning status and efficiency; warnings, etc., Ashley, 1218
  - Avoca, 1213
  - Birmingham, 146
  - Blain, 172
  - Cokesburg, 1077,1080
  - Connellsville, 1329,1341
  - Courtdale, 1218
  - Dallas, 1214,1216
  - Dallastown, 343
  - Dickson City, 158,296,297
  - Duryea, 1213
  - Edwardsville, 1218
  - Irvona, 120,316

Page.

- Boards of Health, Larkesville, 1218
  - Laurel Run, 1214,1216
  - Lewisberry, 335
  - Luzerne, 1218
  - Mahaffey, 315
  - Meadville, 125
  - Millerstown, 172
  - Moosic, 1213
  - Muncy, 217
  - Nanticoke, 1218
  - Nescopeck, 1223,1224,1239
  - Ohiopyle, 139
  - Old Forge, 1213
  - Pittston, 1217
  - Plymouth, 1218
  - Plymouth Twp., 1219
  - Pottsville, 299
  - Sheakleyville, 163
  - South Fork, 1037
  - Taylor, 1215
  - Tunnell Hill, 334
  - Wellsville, 217
  - in the Wyoming Valley, 1215
- Boas-Oppler bacillus, value in laboratory examinations for carcinoma ventriculi, 441
- Boil (cf Furuncle).
- Bonbrake, Dr. H. X., C. M. I., for Franklin Co., 7
  - abstract of report, 140
  - dispensary physician, 24
- Bones, disease of, as a cause of death (cf. Joints, Pott's disease, White swelling), 604,667,685,719,729
- Bouse, Dr. John A., special Medical Inspector, 6
  - report, 219
  - in charge of exhibit, 21,410
  - report, 410
- Bovard, Dr. T. J., C. M. I. for Forest County, 7
  - abstract of report, 140
  - dispensary physician, 24
- Boyd, Dr. G. H., dispensary physician, 22
- Boyer, J. Calvin, Water Works (permit, sources, etc.), 919,934,935
- Boyer, Dr. G. H., dispensary physician, 26
- Brackenridge, Water supply, 919
  - sewerage permits, etc., 944,950,954
- Braddock, tuberculosis dispensary, 22
  - birth statistics, 754,776,802,828,853
  - mortality, 649,692,697,702,708,738
  - tuberculosis mortality, 616,619
  - typhoid death rate, 606
- Braddock township, Water supply, 919
  - sewerage permits, 944
- Bradford County, County Medical Inspector, 7
  - Township Health Officers, 9
  - abstract of reports of C. M. I on communicable diseases, etc., 101,201
  - summary of reports of Health Officers, 204
  - report of Dairy Inspections, 207,210,212
  - notes on Boards of Health, 222
  - tuberculosis dispensaries, 22
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,792,818,844,861
  - rural mortality, 653,695,705,711,740
  - typhoid fever morbidity by months, also urban and rural, 1220,1222

Page.

Bradford, tuberculosis dispensary, ... 25
birth statistics, ... 755,776,802,828,853
mortality, ... 649,692,697,702,708,738
tuberculosis mortality, ... 619
typhoid death rate, ... 606
water works (permit, source, etc.), ... 919,936
sewerage permits, etc., ... 910,944,951

Bradford Twp., water supply, ... 919

Bradford County Water Co., water works, (permit, sources), ... 919,935

Brain disease (cf. Cerebral hemorrhage, encephalitis, mental disease, paralysis, etc.)

Brain, softening of the, as a cause of death, ... 661,679,716,725

Bray, Dr. Edward G., C. M. I. for Carbon Co.; abstract of report, 117
dispensary physician, ... 23

Breast, cancer of the, as a cause of death, ... 659,677,715,724

Breast, disease of the, as a cause of death, ... 667,685,719,728

Breathing, defective nasal, in rural school children, ... 45

Briar Creek Township, Water supply, ... 919,1235

Briar Creek Water Supply Co., water works (permit, sources), ... 919,936

Brickel, B. W., Water works, (permit, sources), ... 919,934

Brides, average age, ... 883
age, ... 888,889
dissolution of former marriages, ... 889
nativity, ... 888
quotity of marriage, ... 889

Bridgeport, Water supply, ... 997,1001

Bridgeton Township, Water supply, ... 919

Bright's Disease (cf. Nephritis).

Bright Run Water Co., water works (permit, sources), ... 919,935

Brisbin, Dr. C. H., C. M. I. for Mifflin county, ... 7
abstract of report, ... 164
dispensary physician, ... 25

Brisbin, Board of Health organized, ... 224
Water supply, ... 919

Bristol, tuberculosis dispensary, ... 22
birth statistics, ... 755,776,802,828,853
mortality by months, ... 649
water supply, ... 909,911,913,919,935,938,995,999
sewerage permits, etc., ... 943,950,951

Bristol Water Co., Water works (permits, sources, plant, etc.), .. 911,919
935,938,992,995,999

Broad Top, status of Board of Health, ... 225

Broadway (Ross Twp.), typhoid fever, ... 1213

Brockway Crystal Water Co., water works (permit, sources), ... 919,935

Brockwayville, Water supply, ... 919

Bronchioles, effect of products of tubercle bacillus, ... 452

Bronchitis, as a cause of death, ... 663,681,708,717,726,743,747,750
in children under two, by days, weeks, months, 624,630,636,642

Bronchopneumonia (cf. Pneumonia), as a cause of death, ... 663,681
717,726,743,747,750
in children under two, by days, weeks, months, ... 624,630,636,642

Brookville, tuberculosis dispensary, ... 24
active Board of Health, ... 1027
water supply, ... 919
report of the Engineering Division on the epidemic of typhoid fever, ... 1023
district, typhoid fever morbidity by months, ... 1349

Brookville Water Co. (permits, sources, etc.), ... 909,911
919,935,938,1026

Brownsville, tuberculosis dispensary, ... 24,402
smallpox, ... 238
sewerage permits, etc., ... 914,954

Browntown Village, Water supply, ... 1096

Bryn Athyn Village Association, sewage disposal plant (permits, etc.), ... 916,944,951,1005,1006

Page.

- Bucher, J. C., Water works (permits, sources), 919,934
- Bucks County, County Medical Inspector, 7
  - Township Health Officers, 9
  - abstracts of reports of C. M. I. on communicable diseases, etc., 106,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 222
  - tuberculosis dispensaries, 22,23
  - tuberculosis mortality, 618
  - rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,793,819,844,862
  - rural mortality, 653,695,705,711,740
  - atlas begun, 907
- Bulletins issued in 1910, 60
- Bullskin Twp. (cf. Connellsville), typhoid fever morbidity by months, 1342
- Bureau of Vital Statistics, organization, 41
  - report, 603
- Burlington, Board of Health appointed, 222
- Burns (conflagration excepted), causing death, 622,670,688,721,730
- Burnside, no Board of Health, 224
- Burrell Township, water supply, 919
  - sewerage permits, 944
- Butler County, County Medical Inspector, 7
  - Township Health Officers, 9
  - abstract of reports of C M. I. on communicable disease, etc., 114,201
  - summary of monthly reports of Health Officers, 204
  - detailed report of dairy inspections, 207,210,212
  - notes on Boards of Health, 223
  - tuberculosis dispensary, 23
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,793,819,845,862
  - rural mortality, 653,695,705,711,740
- Butler, tuberculosis dispensary, 23
  - birth statistics, 755,776,802,828,853
  - mortality, 649,692,697,702,708,738
  - tuberculosis mortality rates for five years, 619
  - typhoid death rate, 606
  - water supply, 913,919,995,999
  - sewerage permits, etc., 910,944,955
- Butler Water Co., water works (permits, sources, plant, etc.), 919,911,919,935,938,992,995,999
- Butter, examination in the laboratory, 438
- Buyers, Dr E S, dispensary physician, 25
- Byrensville, outbreak of typhoid fever, report of the Engineers, 1313

- Calcium oxide, use in purification plants for public water supplies, 999
- Calcium hypochlorite, use in the purification plant of the Connellsville Water Co., 1333,1334
- Calcium hypochlorite, use of, at Nescopeck, 1236
- Calcium hypochlorite, use of, in purification plants for public water supplies, 999
- Calculi, causing death, biliary, 665,683,718,727
  - of the urinary passages, 666,684,718,727
- California, sewerage permits, etc., 944,954
- Callery (Butler), Board of Health organized, 223

Page.

- Cambria County, County Medical Inspector, 7
  - Township Health Officers, 9
  - abstract of reports of C. M. I. on communicable diseases, etc., 114,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 223
  - tuberculosis dispensaries, 23
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,793,819,845,862
  - rural mortality, 654,695,705,711,741
- Cambria Steel Co., waste disposal investigated, 991,1007
- Cambridge Springs, Municipal Water Works (permits, sources, plant, etc.), 913,919,936,938,992,995,999
- Cambridge Springs, sewage permits, etc., 944,950,954
- Cameron County, County Medical Inspector, 7
  - Township Health Officers, 9
  - abstract of reports of C. M. I. on communicable diseases, etc., 116,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 223
  - tuberculosis dispensary, 23
  - tuberculosis mortality for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,793,819,845,862
  - rural mortality, 654,695,705,711,741
- Camp Hill, water supply, 919
- Cancer and other malignant tumors, mortality, 621,659 677,702,715,724,743,747,750
  - studies of carcinoma simplex of the mouse; influence of taurin, 508
  - value of laboratory examinations in carcinoma ventriculi, technique, 441
- Canonsburg, sewerage permits, etc., 944,950,951,943
- Canton (and vicinity), water supply, see below, sewerage permits, etc., 944,952
- Canton Citizens Water Co., water works (permits, sources, plant etc.), 913,995,999
- Carbon County, County Medical Inspector, 7
  - Township Health Officers, 9
  - abstract of reports of C. M. I. on communicable diseases, etc., 117,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 223
  - tuberculosis dispensaries, 23
  - tuberculosis mortality, 617
  - rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 768,793,819,845,862
  - rural mortality, 654,695,705,711,741
- Carbondale, tuberculosis dispensary, 24
  - birth statistics, 755,776,802,828,853
  - mortality, 649,692,697,702,708,738
  - tuberculosis mortality rates for five years, 619
  - typhoid death rate, 606

Page.

Carbondale, sewerage permits, etc., 944,954
Township, sewerage permits, etc., 944
Carbuncle, included under Furuncle
Carcinoma, see Cancer
Caries of the spine, etc. (cf. Pott's disease).
Carlin, Dr. O. J., dispensary physician, 26
Carlisle, tuberculosis dispensary, 23
birth statistics, 755,776,802,828,853
mortality, 649,692,697,702,708,738
tuberculosis mortality, 616,619
water supply, 913,995,999
sewerage permits, etc., 944,950,951,952
Carlisle Gas and Water Co., plant and operation, 995,999
Carmichaels, inspection of its sanitary conditions, 1351
sewerage permits, etc., 944,950,951,1352
Carnegie, tuberculosis dispensary, 22
births, 755,777,803,828,853
mortality, 649,692,697,702,708,738
Carr, Dr. G. W., dispensary physician, 25
Carrick, birth statistics, 755,777,803,829,853
mortality by months, 650
sewerage permits, etc., 944,950,955
Carroll Township (Washington), water supply, 919
sewerage permits, 944
Carroll Township (York), typhoid fever, 1071
Cass Township, water supply, 919
Cassville, no Board of Health, 225
Catasauqua, birth statistics, 755,777,803,829,853
mortality by months, 650
water works (permits, sources), 919,934
Catawissa, water supply, 919
Catawissa Water Co., water works (permits, sources), 919,936
Cawley, Dr. Morris F., C. M. I. for Lehigh Co., 7
abstract of report, 154
dispensary physician, 24
Cecil Township (cf. Penna. Reform School, Morganza); Sewerage permits, 944
"Cellular tissue" (subcutaneous), included under Skin.
Central Colliery Water Co., 1085
Centre County: County Medical Inspector, 7
Township Health Officers, 10
abstract of reports of C. M. I. on communicable diseases, etc., 118,201
summary of reports of Health Officers, 204
report of dairy inspections, 207,210,212
notes on Boards of Health, 223
tuberculosis dispensaries, 23
tuberculosis mortality rates for five years, 620
poliomyelitis, 294
marriages, 884
rate (1906-1910), 887
rural births, 768,793,819,845,862
rural mortality, 654,695,705,711,741
Centre Township, typhoid fever (and the Lime Ridge epidemic), 1275,1276
Centreport (Berks), no Board of Health, 222
Centreville, no Board of Health, 224
Cerebral hemorrhage (apoplexy, softening), as a cause of death, 661,679,708,716,725,743,747,750
Cerebrospinal fever (cf. Meningitis), as a cause of death, 661,716
Meningitis, (cf. Meningitis), morbidity, 869,870
mortality, 661,679,716,725
in the counties, and with reference to dairy regulation, 67,129,185,200,201
Ceylon (Cumberland Twp.), inspection of typhoidal conditions, 1353
Chalfont, status of Board of Health, 222

Page.
Chambersburg, tuberculosis dispensary, 24
  birth statistics, 755,777,803,829,853
  mortality, 650,692,697,702,708,738
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  water works (permits, sources), 919,935
  sewage disposal plant (permits, etc.), 944,950,951
Chapman Township (cf. Renovo), water supply, 919
  sewerage permits, 944
Charleroi, birth statistics, 755,777,803,829,853
  mortality, 650
  sewerage, permits, etc., 944,955
  water supply, 913,919
Charleroi Water Co., water works (permits, supply, plant, etc.), 909,911,919,935,938,992
Chartiers Township, sewerage, permits, etc., 944,955
Chase, Dr. W. D., dispensary physician, 25
Cheltenham Township, Water supply, 919
Chemicals, use in purification plants for public water supplies, 999
Chemical examinations, frequency of, in water purification, plants, 993,999
Chest measurements of dispensary patients, 423
Chest Springs, no Board of Health, 223
Chester County, County Medical Inspector, 7
  Township Health Officers, 10
  abstract of reports of C. M. I. on communicable diseases, etc., 118,201
  summary of reports of Health Officers, 204
  report of dairy inspections, 207,210,212
  notes on Boards of Health, 223
  tuberculosis dispensaries, 23
  tuberculosis mortality, 618
  rates for five years, 620
  poliomyelitis, 294
  marriages, 884
  rate (1906-1910), 887
  rural births, 769.793,819,845,862
  rural mortality, 654,695,705,711,741
  atlas begun, 907
Chester, tuberculosis dispensary, 23
  births, 755,777,803,829,853
  mortality, 650,692,697,702,708,723,738
  tuberculosis mortality rates for five years, 619
  typhoid death rate, 606
  special reports concerning the epidemic of dysentery (?) 233,447,524,1019
  Water supply (cf. New Chester Water Co.), 913,919,995.999
  sewerage, permits, etc., 910,944,950,951,954
Chester Twp., Water supply, 919
Chester Springs Soldiers' Orphans' School, sewage disposal plant (permits, etc.), 915,944,951,1005
Cheswick, sewerage permits, etc., 944,950,954
Chichester Water Co., water works (permits, sources), 919,935
Chicken Pox, morbidity, 869,870
  in rural school children, 45,72
  in rural sections of counties (cf. abstracts of reports of C. M. I.), summaries, 67.201
  cases like smallpox, 242
Chief of Division of Distribution of Biological Products (cf. H. W. Peirson).
Chief Engineer, (cf. F. H. Snow).
Chief of the Laboratories, (cf. H. Fox).
Chief Medical Inspector, (cf. A. B. Moulton, B. F. Royer).
Childbirth, (cf. Birth, Pregnancy, Puerperal state).
Children's House at Mont Alto, 49
Children, Medical Inspection of School Children, 44,68

Page.

Chinese mortality (see also Color), Urban, ... 733,736,738
  rural, ... 734,737,740
Chloride of Lime, etc. (cf. Calcium).
Chlorosis (cf. Anaemia).
Cholera asiatica, ... 657,869
  letter to Health Officers, circular of advice to immigrants, ... 83
  search for suspects, ... 95,114,119,156,159
Cholera infantum, in Wilkes-Barre by months, 1908-1910, ... 1223
Cholera nostras, as a cause of death, (cf. Diarrhoea, Dysentery), 657,675,714,723,743,747,750
Chorea, as a cause of death, ... 661,679,716
Christian, Dr. J. L., C. M. I. for Sullivan County, ... 7
  abstract of report, ... 185
Church Club of the Diocese of Harrisburg, address before the ... 57
Chyluria, as a cause of death, ... 666,684,718,727
Circulatory system, (cf. Arteries, Hæmorrhage, Heart, Lymphatics, Veins).
Circulatory system, Disease of, as a cause of death, 604,621,662,680,717,726
Circulars, issued or revised, ... 53,74,80,83
Cirrhosis of the Liver, as a cause of death (cf. Liver), 665,683,708,718,727
Citizens Water Co. (Canton), Water Works (permits, sources, plants, etc.), ... 913,995,999
Citizens Water Co. (Dorranceton), ... 1087
Citizens Water Co. of Gordon, Water works (permit, sources), 919,936
Citizens Water Co. of Kittanning, Water works (permit, sources, etc.), ... 919,936,938
Citizens Water Co. (Matamoras), Water works (permit, sources), ... 924,934
Citizens Water Co. of New Bethlehem, Water works (permits, sources, plant, etc.), ... 919,935,938,992,997,1000
Citizens Water Co. of Scottdale, relation to the outbreak of typhoid fever, ... 1056 seq.
Citizens Water Co. (Washington), purification plant and operation, 998,1001
Citizens Water and Gas Co. of Williamsport, Water works (permit, sources), ... 919,935
Civil condition (cf. divorce, marriage): of dispensary patients, 413
  of sanatorium patients, ... 367,376 seq.
Clairton, sanitary conditions investigated by the General Inspector, ... 218
Clarion County, County Medical Inspector, ... 7
  Township Health Officers, ... 10
  abstract of reports of C. M. I. on communicable diseases, etc., ... 121,201
  summary of reports of Health Officers, ... 204
  report of dairy inspections, ... 207,210,212
  notes on Boards of Health, ... 224
  tuberculosis dispensary, ... 23
  tuberculosis mortality for five years, ... 620
  marriages, ... 884
  rate, (1906-1910), ... 887
  rural births, ... 769,793,819,845,862
  rural mortality, ... 654,695,705,711,741
Clarion, tuberculosis dispensary, ... 23
  Water supply, ... 913,919,995,999
Clarion Water Co., water works (permits, sources, plant, etc.), 919 936,938,995,999
Clark, Dr. Nelson, dispensary physician, ... 22
Classes, tuberculosis, ... 430
Classification of cases of tuberculosis used in the sanatorium, 372
Cleaning (cf. Sanitary Cleaning).
Clear Brook Water Co., ... 1087
Clearfield County, County Medical Inspector, ... 7
  Township Health Officers, ... 10
  abstract of reports of C. M. I. on communicable diseases, etc., ... 120,201

Page.
Clearfield County, summary of monthly reports of health officers, ... 204
detailed report of dairy inspections, ...207,210,212
notes on Boards of Health, ... 224
tuberculosis dispensaries, ... 23
tuberculosis mortality for five years, ... 620
poliomyelitis, ... 294
marriages, ... 884
rate, (1906-1910), ... 887
rural births, ...769,793,819,845,862
rural mortality, ...654,695,705,711,741
typhoid fever morbidity by months, ... 1327
Clearfield, tuberculosis dispensary, ... 23
birth statistics, ...755,777,803,829,853
mortality, ... 650
typhoid fever morbidity by months, ... 1327
water supply, ... 919
sewerage permits, etc., ...910,944,954
Clearfield Water Co., water works, (permit, sources), ... 919,935
Cleaver, Dr. Israel, C. M. I. for Berks Co., ... 7
abstract of report, ... 95
dispensary physician, ... 22
Clerks, ...6,17,20,21,28,39,41,42,901,1378
Clifton Heights, Water Supply, ... 920
Clinton County, County Medical Inspector, ... 7
Township Health Officers, ... 10
abstract of reports of C. M. I. on communicable diseases, etc., ... 123,201
summary of reports of Health Officers, ... 204
report of dairy inspections, ...207,210,212
notes on Boards of Health, ... 224
tuberculosis Dispensaries, ... 23
tuberculosis is mortality rates for five years, ... 620
marriages, ... 884
rate (1906-1910), ... 887
rural births, ...769,793,820,845,862
rural mortality, ...654,695,701,711,741
Clintonville, sewerage permits, ... 944,952
Clymer Water Co. (Indiana), water works (permits, sources, plant, etc.), ...911,920,935,938,996,1000
Coal Creek, as a water supply, ... 1110
and the Wyoming Valley epidemic, ... 1115
Coaldale, births, ...756,777,803,829,853
mortality, ... 650
water supply, ... 920
sewerage permits, etc., ...944,950,954
Coatesville, tuberculosis dispensary, ... 23
births, ...756,777,803,829,854
mortality, ...650,692,697,703,709,738
typhoid death rate, ... 606
Coats for tuberculous patients in use at Otisville, N. Y., ... 251
Cobaugh, Christ H., assistant tuberculosis exhibit, ... 21
Codorus Creek, inspection, pollutions, ets., ...1289,1293
status of the case of B. F. Sheffer et al. charged with pollution, ... 1370
Cohen, Dr. Joseph, dispensary physician, ... 23
Cokeburg, epidemic of typhoid fever, engineering report, ... 1077
Cold, excessive, as a cause of death, ...671,689,721.731
College Township (cf. State College), sewerage permits, ... 944
water supply, ... 920
College Hill, sewerage permits, etc., ... 944,952
College of Pharmacy, Philadelphia, special lecture before the, ... 57
College of Physicians of Philadelphia, Department, represented at a Symposium on Acute Anterior Poliomyelitis, ... 58
Colletti, Dr. Ferdinando, dispensary physician, ... 22
Collingdale, water supply, ... 920
Color of patients at Mont Alto Sanatorium, ...376 seq.

Page.

- Color of patients of the Dispensaries, 414
- Color and morbidity, 875,876,878,880
- Color and mortality, 732,733,735,736,738,740,743,746
- Color wheel of tanneries, action of the waste on *B. anthracis* and *B. coli communis*, 521
- Columbia County, County Medical Inspector, 7
  - Township Health Officers, 10
  - abstract of reports of C. M. I. on communicable diseases, 123,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 224
  - tuberculosis dispensaries, 23
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910), 887
  - rural births, 769,794,820,845,862
  - rural mortality, 654,695,705,711,741
  - typhoid fever morbidity by months, also urban and rural, 1220,1222
- Columbia, tuberculosis dispensary, 24
  - births, 756,777,803,829,854
  - mortality, 650,692,697,703,709,738
  - tuberculosis mortality, 616,619
  - typhoid death rate, 606
  - water supply, 913,995,999
  - sewerage permits, etc., 944,950,954
- Columbia Water Co., purification plant, 992,995,999
- Columbus Township (cf. Howard Tannery); sewerage permits 944
- Colwyn, water supply, 920
  - sewerage permits, etc., 944,950,951,954
- Combustion (cf. Fire).
- Commissioner of Health (cf. S. G. Dixon).
- Common Drinking Cup to be avoided in schools, 46
- Communicable diseases (cf. abstracts of reports of C. M. I., morbidity and mortality of each); action of the Advisory Board, 43,44
  - Summary of inspections, in relation to dairies, 201
  - neglect to report prosecuted, 217
- Complaints (cf. Petitions).
- Conewango Township (cf. State Hospital), Warren.
- Conferences, conventions and addresses, 56
- Conflagration, as a cause of death, 670,688,721,730
- Congenital causes of death (cf. debility, malformations).
- Conneaut Lake, no Board of Health, 224
- Conneautville, water works (permit, sources), 913,920,934
- Connecticut (State), typhoid death rate (1909-1910), 606
- Connellsville, births, 756,778,804,829,854
  - mortality, 650,692,697,703,709,738
  - typhoid death rate, 606
  - morbidity (1906-1910), by months, 1330
  - Board of Health, 1329,1341
  - letter to it, 1330
  - report of the Division of Sanitary Engineering on the epidemic of typhoid fever, 1329
  - (and vicinity) water supply, 995,999,1330
  - sewerage permits, etc., 944,955
  - Township, typhoid fever morbidity by months, 1342
- Connellsville Water Co., history, sources, conditions, 1331
- Connellsville Water Works Co., purification plant and operations, 992,995,999
- Conshohocken, births, 756,778,804,830,854
  - mortality, 650
  - water supply, 920
- Construction work of the Engineering Division, 955
- Consumers Water Co. of Honesdale, history, 1241

Page.
Consumption (cf. tuberculosis).
Contagious disease (cf. communicable disease).
Conventions, at which the Department was represented, ... 56
Convulsions, puerperal, as a cause of death, ...667,685,719,728
  nonpuerperal, as a cause of death, ...661,679,716,725
  causing death in children under two, by days, weeks, months, ...624,630,636,642
  in children under two, in Wilkes-Barre by months (1908-1910), ... 1223
Conway, water works, (permit, sources), ... 920,934
Conyngham Township, water supply, ... 920
Copper sulphate, use in water purification, at Glen Rock, ... 1307
  for Harveys Creek, ... 1112
  at the Penna. Indr. Reformatory, ... 1262
  at Mt. Joy, ... 1282
Coraopolis, births, ...756,778,804,830,854
  mortality, ... 650
  sewerage permits, etc., ... 944,955
  outbreak of typhoid fever, report of the Division of Engineering, ... 1316
  typhoid morbidity (1905-1910), ... 1318
Cork Lane Village (Pittston Twp.), water supply, ... 1096
Corporation reports (water supplies, sewerage), ... 903
Corry, tuberculosis dispensary, ... 24
  births, ...756,778,804,830,854
  mortality, ... 650
  sewerage permits, etc. (cf. Howard Tannery), ... 944,954
Cotton seed oil, for patients of the tuberculosis dispensaries, ... 399
  special report on its use at Dispensary No. 20, 411
Coudersport, tuberculosis dispensary, ... 26
  sewerage permits, etc., ...910,944,950,952
Counsel, special, in charge of cases referred for settlement, ... 1369
County Medical Inspectors, by counties, ... 7
  special work of, ... 67
  abstracts of reports, ... 85
Courtdale, water supply, ...1087,1109
  letter to council concerning Board of Health, etc., ... 1218
Covey Reservoir Supply to Wyoming Valley, ... 1094
  and the epidemic, ... 1115
Cows and cow barns, sanitary inspections (cf. Dairies), ...205,207,210
Cow, experimental study of the effect of injections of human tubercle bacilli, ... 447,455
Cramer, Dr. M. J., dispensary physician, ... 27
Crawford County, County Medical Inspector, ... 7
  Township Health Officers, ... 10,11
  abstract of reports of C. M. I. on communicable diseases, etc., ... 125,201
  summary of reports of Health Officers, ... 204
  report of dairy inspections, ...207,210,212
  notes on Boards of Health, ... 224
  tuberculosis dispensaries, ... 23
  tuberculosis mortality rates for five years, ... 620
  poliomyelitis, ... 294
  marriages, ... 884
  rate (1906-1910), ... 887
  rural births, ...769,794,820,846,862
  rural mortality, ...654,695,705,711,741
Cressing, Dr. J. B., dispensary physician, ... 25
Cressman, Philip, for Perkasie, sewage disposal plant, (permits etc.), ...916,947,950,951,1006
Cresson Sanatorium, work done by the engineering division, .. 969
  gift of a cottage, ... 50
Cresson, water works (permit, sources), ... 920,935
  sewerage permits, etc., ...944,950,955
Cresson Twp., Water Supply, ... 920
Cresson Water Co., water works (permit, sources), ...911,920,936
Cressona, Water supply, ... 920

Page.

- Crosby Gas Co., water works (permit, sources), 920,934
- Cross Creek Twp., Typhoid fever morbidity in 1910, by months, 1286
- Croup (cf. Diphtheria).
- Crushing, Suicidal, and Accidental, as a cause of death, 670,671,688,721,730
- Crystal Lake, as a water supply, 1102
  - and the epidemic, 1115,1128
- Crystal Spring Water Co., 1087
- Cumberland County, County Medical Inspector, 7
  - Township Health Officers, 11
  - abstract of reports of C. M. I. on communicable diseases, etc., 127,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 224
  - tuberculosis dispensaries, 23
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 884
  - rate (1906-1910); 887
  - rural births, 769,794,820,846,862
  - rural mortality, 654,695,705,711,741
  - medical inspection of school children in rural districts, 45,72
- Cumberland Twp. (Greene), Report of the engineering division on typhoidal conditions, 1351
  - typhoid morbidity by months, 1353
- Cumberland Valley Medical Association, Department represented at the annual meeting, 58
- Cummings, C. Howe, assistant engineer, 38,233,898,900,1019
- Curtis, (J. G.) Leather Co., water works (permit, sources), 920,934
- Cysts (cf. Ovary, etc.).
- Dairies, special report of inspections with reference to typhoid fever in Harrisburg, 306
- Dairy farms, inspection and regulation (cf. abstracts of reports of C. M. I.), 60,67,75,77,201,205,207
- Daland, Dr. Judson, aids in a laboratory investigation, 470
- Dale, Water supply, 920
- Dallas, No Board of Health, 1214
  - letter to council thereon, 1216
  - typhoid fever, 1212
  - water supply, 920
- Dallas Water Co., water works (permit, sources), 920,934
- Dallastown, Whooping cough, 342
  - Board of Health inefficient, 343
- Danville, tuberculosis dispensary, 25
  - births, 756,778,804,830,854
  - mortality, 650
  - municipal water works (permit, plant, and operation), 913,920,995,999
  - (cf. State Hospital), sewerage permits, etc., 944,952
- Darby, births, 756,778,804,830,854
  - mortality, 650
  - water supply, 920
  - sewerage permits, etc., 910,944,950,951,954
- Darby Twp., Water supply, 920
- Darlington (Beaver), Board of Health inactive, 222
- Dauphin County, County Medical Inspector, 7
  - Township Health Officers, 11
  - abstract of reports of C. M. I. on communicable diseases, etc., 131,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,212
  - notes on Boards of Health, 224
  - tuberculosis dispensaries, 23
  - tuberculosis mortality, 617
  - rates for five years, 620

Page.
Dauphin County, poliomyelitis, ... 294
marriages, ... 884
rate (1906-1910), ... 887
rural births, ...769,794,820,846,862
rural mortality, ...654,695,705,711,741
medical inspection of school children in rural districts, ... 45,72
Dauphin, Board of Health inactive, ... 224
Water supply, ... 920
Dauphin Consolidated Water Supply Co., Water works (permits, sources, plant, etc.), ...920,936,938,992,996,999
Davis, Dr. Fannie, dispensary physician, ... 26
Davis, Dr. Walter, dispensary physician, ... 25
Death (cf. Mortality), with ill defined or unspecified cause, 673,691,722,731
in children under two, by days, weeks, months, ...625,631,637,643
sudden as an ill defined cause of death (cf. Puerperal state), ...672,691,722,731
rates, ... 603-623
at Mont Alto Sanatorium, ...368,376 seq.
Debility, Congenital, etc. (Icterus, sclerema; cf. Malformations),
as a cause of death, ... 668,669
708,720,729,744,747,750
in children under two, by days, weeks, months, ...624,630,636,642
Decrees (cf. permits), no longer published in detail, ... 1375
Defects, Physical, in rural school children, ... 45,72
Delaware County, County Medical Inspector, ... 7
Township Health Officers, ... 11
abstract of reports of C. M. I. on communicable diseases, etc., ... 133,201
summary of reports of Health Officers, ... 204
report of dairy inspections, ...207,210,212
notes on Boards of Health, ... 225
tuberculosis dispensary, ... 23
tuberculosis mortality, ... 618
rates for five years, ... 620
poliomyelitis, ... 294
marriages, ... 884
rate (1906-1910), ... 887
rural births, ...769,794,820,846,862
rural mortality, ...654,695,705,711,741
Delaware Twp., Water supply, ... 920
Delaware River water in the epidemic at Chester, ... 236
Delmont Land Co. (cf. Dormont), sewerage permits, etc., ...944,950,955
Dementia paralytica (cf. Paralysis).
Denver, Water works (permit, sources), ... 920,937
Department of Health, organization, ... 6
general results (extract from the last message of Governor Stuart), ... 61
A National, Correspondence concerning, . 55
Deputy Field Officers, ... 900
Dermady Sanatorium, Morton, Delaware Co., sewage disposal plant (permits, etc.), ...916,944,951,1005
Derry, sewage disposal plant (permits, etc.), ...915,944,950,951,1005,1006
Derry Twp., Water supply, ... 920
Designs and Construction work of the engineering division, ... 955
Devon (Citizens) (cf. Easttown Twp.), sewerage (permits, etc.), 944,952
Devon Drainage Co., sewage disposal plant, ...916,1005
Diabetes, as a cause of death, ...659,677,702,715,725
Diamond Water Co., Water works (permit, sources), ... 920,937
Diarrhoea (and Enteritis), as a cause of death, ...622,664,683,708,718, 727,744,747,750
special tabulation for children of the State and certain cities, under two years, by days, weeks, months, 624,630, 636,642

Page.

- Diarrhoea (and Entritis) in children under two, in Wilkes-Barre, by months, 1908-1910, ... 1223
- Diarrhoeal conditions in Chester, special medical and laboratory reports, 233,524
- Diarrhoea, in dairy inspection, summary, 206
  - details by counties, 212
- Diazo-reaction, laboratory examinations, 441
- Dickson, Dr. J. R., C. M. I. for Adams County, 7
  - abstract of report, 85
  - temporarily in charge of McSherrystown, 85
  - dispensary physician, 22
- Dickson City, New Board of Health, 158
  - births, 757,778,804,830,854
  - mortality, 650
  - special medical report on the outbreak of smallpox, 295
  - water supply, 920
  - sewerage permits, etc., 944,950,955
- Diet List of the Penna. Industr. Reformatory, 1267
- Dietetics, Popular Instruction in, 46
- Digestive system (cf. Stomach, Intestine, etc.), disease of the, as a cause of death, 604,622,664,665,682,683,717,718,727
- Dillsburg, Water supply, 921
  - engineering report concerning an outbreak of Typhoid fever, 1071
- Dillsburg Water Co., water works (permit, sources), 921,934
  - Investigation, 1074
- Dimm, Dr. C. H., C. M. I. for Union County, 7
  - abstract of report, 189
  - dispensary physician, 26
- Dingman's Ferry Water Co., water works (permit, sources), 911,921,935
- Diphtheria (and Croup), morbidity, 869,870,875
  - (cf. also the tables concerning treatment with antitoxin, 542)
  - Mortality statistics, 542,608,609,657,675,702,714 723,743,747,750
  - for infants under two years, by days, weeks, months, 624,630,636,642
  - in rural portions of counties, and incidental regulation of dairies (cf. abstracts of reports of C. M. I.), summaries, etc., 67,201
  - in rural school children, 45
  - reports of epidemics or investigations concerning them:
  - Franklin, 349
  - Pottsville, 299
  - Tressler Orphan Home, 237
  - Waynesboro, 301
  - Wiconisco, 53,259,266,319
  - laboratory examinations, 438
- Diphtheria antitoxin distributors, 28
  - distribution and use, 55,530
- Diseases, Morbidity and Mortality: look for each disease of the International List. For general diseases see pp. 604,656,660, 674,678,714,715,723,725
  - For ill defined or unknown diseases, as cause of death, see pp., 672,690,722,731,744,747,751 and the detailed statistics for infants under two years (625,631, 637,643)
  - N. B. Chicken pox, German measles, Mumps, are included in "other epidemic diseases" of the list.

Page.
Diseases, Morbidity and Mortality: Diseases in relation to milk production and sale (cf. abstracts of reports of C. M. I.), summaries, ... 205,212
in rural school children as noted in the medical inspection, ... 45,72
made reportable in 1910, ... 43
Disinfectants: cf. Calcium Hypochlorite, Copper sulphate, Formaldehyde, Iron sulphate.
Disinfectants, and outfits, amounts furnished, ... 1378
Disinfection (cf. also sanitary cleaning); Memoranda of work done (cf. abstracts of reports of C. M. I.), ...68,204,400
Dispensary, Fraudulent, prosecuted, ... 218
Dispensaries, Tuberculosis, sub-division of, ... 20
annual report, ... 398
location, physicians, nurses, hours, . 22
investigations by the general inspector, ... 217
Distributors, of Diphtheria Antitoxin, ... 28
of Tetanus Antitoxin, ... 594
Divisions of the Department of Health, division of accounting and purchasing, ... 42,1379
for the control of tuberculosis, ...18,49,363
sub-division of Sanatoria, ...18,49,365
sub-division of tuberculosis dispensaries, ...20,51,398
sub-division of tuberculosis exhibit, ... 52,410
of distribution of Biological Products, ...28,55,527
general, ... 6
sub-division of general inspection, ... 48,215
of laboratories and experimental station, ... 17,435
of medical inspection, ... 6,44,63
sub-division of special medical inspection, ... 219
of sanitary engineering, ... 38,895
of supplies, ... 42,1377
of vital statistics, ...41,54,601
sub-division of morbidity statistics, ... 41,867
sub-division of marriage statistics, ... 41,881
Divorced persons married in 1910, ... 889
Dixmont (cf. W. Penna. Hosp. for the Insane, Kilbuck Twp.)
Dixon, Dr. Samuel G., Commissioner of Health.
Letter of Transmittal, ... 3
fifth annual report, ... 5
requested by the Advisory Board to make a medical inspection of the schools, 43
"Talks," 62
address at the meeting of the American Public Health Association, ... 58
before the Church Club of the Diocese of Harrisburg, ... 57
at the convention of Engineers of Pennsylvania, ... 57
at the meeting of the McKeesport Academy of Medicine, ... 58
at the meeting of the Medical Society of Pennsylvania, ... 58
before the Pittsburgh Chamber of Commerce, ... 56
before the Philadelphia College of Pharmacy, ... 57
before the Western Pennsylvania Health Conference, ... 59
represented at other conferences, etc., .. 57,58,59
letter to Senator Owen concerning a National Department of Health, ... 56
research work (cf. report of the laboratories), on the effect of Taurin on tumors of dogs and mice, ... 447,508

Page.

- Dixon, Dr. Samuel G., (With D. Divas) on the presence of B. *anthracis* in the fleshings of hides,.. 447,520
  - (With D. Rivas) on the effect of mine waste water upon B. *anthracis* and B. *communis*, 447,521
- Dog, Tumors of: research on the effect of Taurin, 447,508
- Donegal, No Board of Health, 230
- Donora, births, 757,779,805,830,854
  - mortality, 650
  - Water supply, 921
  - sewerage permits, etc. (cf. Am. Steel and Wire Co.), .. 944,953
- Donora Water Co., water works (permit, sources, etc.), 909,911,921,935
- Dormont (cf. Delmont Land Co.), sewage disposal plant (permits, etc.), 910,944,950,952
- Dorranceton, Water supply, 1087,1109
  - typhoid fever, 1115,1212
  - notified to enforce sanitary regulations, 1220
  - sewerage permits, etc., 945,950,954
- Douglass, Dr. W. T., dispensary physician, 23
- Dover, water works (permit, sources), 921,934
- Doylestown, tuberculosis dispensary, 23
  - water works (permit, sources), 921,937
- Doylestown Sewerage Co., sewage disposal plant (permits, etc.), 910,916,945,951,1006
- Draughting Room, general report of work done, 907
- Draughtsmen, 39,899,901
- Dravosburg, health committee as a Board of Health, 221
- Drocton Land Co. (cf. Renovo), sewerage permits, etc., 945,955
- Drowning, as a cause of death, Accidental, 622,670,688,721,730
  - Suicidal, 669,687,720,729
- DuBois, John E., water works (permit, sources), 921,937
- DuBois, tuberculosis dispensary, 23
  - births, 757,779,805,831,854
  - mortality, 650,692,697,703,709,739
  - tuberculosis mortality rates for five years, 619
  - typhoid death rate, 606
  - water supply, 921,935
  - sewerage permits, etc., 945,955
- Dumping grounds, petitions and complaints, 903
- Dunbar Twp., typhoid fever morbidity by months, 1342
- Duncannon, Water supply, 921
- Dundaff, No Board of Health, 229
- Dunmore, births, 757,779,805,831,854
  - mortality, 650,692,697,703,709,739
  - tuberculosis mortality, 616,619
  - sewerage permits, etc., 945,950,953
- Duquesne, births, 757,779,805,831,854
  - mortality, 650,693,698,703,709,739
  - tuberculosis mortality, 616,619
  - typhoid death rate, 606
- Duryea, births, 757,779,805,831,854
  - mortality, 650
  - Water supply, 1086,1091
  - typhoid fever, 1115,1212
  - Board of Health inactive, 1213
  - letter in council, 1214
- Dushore, tuberculosis dispensary, 26
- Dysart, A. P. (cf. Scott Twp.), sewerage permits, etc., 945,950,953
- Dysentery, as a cause of death (cf. Diarrhoea), 657,675,714,723
  - in infants under two, by days, weeks, and months, 624,630,636,642
  - epidemic, morbidity, 869,871
  - reputed outbreak of, at Chester. Reports, medical, . 233
  - bacteriological, 447
  - engineering, 1019

Page.
Eagles Mere, Water supply (cf. water company below), sewerage permits, etc., ... 945,950,954
Eagles Mere Water Co., water works (permits, sources, operation, etc.), ... 909,911,921,937,938,992,995,999
Ear affections in rural school children, ... 45
Ears, disease of the, as cause of death, ... 662,680,717,725
East Bethlehem Township (cf. Vesta Coal Co.), sewerage permits, 945
East Brady, Water supply, ... 921
  sewerage permits, etc., ... 945,950,952
East Brady Water Works Co., Water works (permits, sources), 921,934
East Conemaugh, births, ... 757,779,805,831,855
  mortality, ... 650
East Deer Township, Water supply, ... 921
East End Sewer Co., (cf. Sunbury), sewerage permits, etc., ... 952
East McKeesport, Water supply, ... 921,937
  sewerage permits, etc., ... 945,955
East McKeesport Water Co., Water works (permit, sources), .. 921
East Mauch Chunk, sewerage permits, etc., ... 945,950,952
East Pennsboro Township, Water supply, ... 921
East Pittsburgh, births, ... 757,779,805,831,855
  mortality, ... 650
  Water supply, ... 921
East Stroudsburg, (cf. A. R. Brittain), sewerage permits, etc., .. 945,952
East Vincent Twp., (cf. Eastern Penna. State Institution near Spring City).
East Washington (cf. Washington), sewage disposal plant, .. 915,1005
East Washington, charged with maintaining a nuisance by the operation of a disposal plant, status of the case, ... 1370
East Wilkinsburg, sewerage plans, ... 950
East Wilkinsburg Improvement Co., (cf. Braddock and Wilkins Twps.), sewerage permits, etc., ... 945,953
Eastern Pennsylvania State Institution for the Feeble Minded & Epileptics, (East Vincent Twp. and Spring City), Water works (permit, sources), ... 921,930,937,939
  sewage disposal plant, (permits, etc.), ... 915,945,951,1005,1006
Eastmere Water Co., Water works (permit, sources), ... 921,935
Easton, tuberculosis dispensary, ... 25
  births, ... 757,779,805,831,854
  mortality, ... 650,693,698,703,709,723,739
  tuberculosis mortality, ... 616,619
  typhoid death rate, ... 606
  malaria (laboratory report), ... 438
  water supply, ... 921
  sewerage permits, etc., ... 945,950,951,952
Easttown Twp., (cf. Devon), Water supply, ... 921
  sewerage permits, etc., ... 945
Echard, Dr. T. B., dispensary physician, ... 24
Ecthyma impetiginosum, complicating poliomyelitis, ... 347
Eddystone, Water supply, ... 921
Edgemont Water Co., Water works (permits, sources), ... 921,935
Edgewood, Water supply, ... 921
Edgeworth, sewerage permits, etc., ... 945,952
Edinboro, Water works (permits, sources), ... 921,934
  sewerage permits, etc., ... 945,952
Edwards, Dr. J. F., dispensary physician, ... 22
Edwardsville, births, ... 757,779,805,831,854
  mortality, ... 650
  water supply, ... 1087,1109
  typhoid fever, ... 1115,1212
  letter to council concerning Board of Health, etc., 1218
  sewerage permits, etc., ... 945,950,955
Edwardsville Water Co., ... 1087
Egger, Prof. F., of Switzerland, Comments on Mt. Alto Sanatorium, 49
Eggs, given dispensary patients, ... 399
Eldred, Water supply, ... 921
Electric power plant for Cresson Sanatorium, ... 974

Page.
Electricity (lightning excepted) as a cause of death, ...672,690,721,731
Elgin, Board of Health organized, ... 225
Elizabeth, Water supply, ...913,995,999
  Health officer but no Board, ... 221
Elk County, County Medical Inspector, ... 7
  Township Health Officers, ... 11
  abstract of reports of County Medical Inspector, investigation of communicable diseases, and regulation of dairies because of them, ... 137,201
  summary of reports of Health Officers, ... 204
  report of dairy inspection, ...207,210,212
  notes on Boards of Health, ... 225
  tuberculosis dispensary, ... 24
  tuberculosis mortality rates for five years, ... 620
  poliomyelitis, ... 294
  marriages, ... 884
  rate (1906-1910), ... 887
  rural births, ...769,794,820,846,863
  rural mortality, ...654,695,705,711,741
Elk Tanning Co., tannery at Stoneham, Warren Co., sewage disposal plant (permits, etc.), ...910,915,1005,1006
Ellenberger, Dr. J., dispensary physician, ... 23
Ellsworth, typhoid fever, ... 1079
Ellwood City, Water supply, ...913,921,996,999
  sewerage permits, ...945,950,952
Ellwood Water Co., Water works (permits, sources, operation, etc.), ...909,921,935,938,992,996,999
Elwyn, (cf. Penna. Training School), sewerage permits, ... 945
Ely, Dr. H. B., C. M. I., for Wayne County, ... 7
  abstract of report, ... 195
  dispensary physician, ... 27
Ely, Moses, K., Chief Sanitary Inspector, ...39,900,901,1081
Embolus, (cf. Puerperal State).
Embolism (& Thronbosis), as cause of death, ...662,680,717,726
Emerson, Chas. A., Jr., assistant engineer, ... 897,900
Emlenton, Water supply, ... 921,937
Emlenton Water Co., Water works permits, ... 921
  sewerage permits, etc., ...945,950,955
Emphysema, Pulmonary as a cause of death, ...664,682,717,727
Emporium, tuberculosis dispensary, ... 23
  Water supply, ... 921
  sewerage permits, etc., ... 945,952
  Board of Health reorganized, ... 223
Emporium Water Co., Water works (permits, sources), ... 921,935
Emsworth, Water supply, ... 921
  sewerage permits, etc., ...945,950,955
Encephalitis, as a cause of death, ...660,678,716,725
Endocarditis, Acute, as a cause of death, (cf. Heart disease),662,680,717,726
Engineering and Engineers (cf. Division of Sanitary Engineering, ...38,397,900
Engineers of Pennsylvania, address before the convention of, .. 57
Ennis, William E., assistant engineer, ...38,898,900,1355,1362
Enola, Water supply, (cf. Dauphin Cosol. Water Co.), ..913,921,996,999
Enola Realty Co., sewage disposal plant, ... 916
Enola Sewage Co., disposal plant, ...1005,1006
Enon Valley, Status of Board of Health, ... 226
Enteritis (cf. Diarrhoea).
Entero-Colitis, in children under two, in Wilkes-Barre by months, 1908-1910, ... 1223
Epidemics, for special reports see diarrhoea (dysentery), diphtheria, measles, poliomyelitis, scarlet fever, smallpox typhoid fever, whooping cough. The medical reports begin on page, ... 233
  those of the engineers at page, ... 1019
Epilepsy, as a cause of death, ...661,679,716,725
Epithelium, research on the effect of products of tubercle bacilli, 450

Page.

Erie County, County Medical Inspector, 7
  Township Health Officers, 11
  abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 138,201
  summary of reports of Health Officers, 204
  report of dairy inspections, 207,210,213
  notes on Boards of Health, 225
  tuberculosis dispensaries, 24
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 884
  rate (1906-1910), 887
  rural births, 769,794,821,846,863
  rural mortality, 654,695,705,711,741
Erie, tuberculosis dispensary, 24
  births, 757,779,805,831,855
  mortality, 650,693,698,703,709,714,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  sewerage permits, etc., 945,950,952,954
Erie Improvement Co. (cf. Mill Creek and Harbor Creek Townships), sewerage permits, etc., 945,954
Ernest, Water supply (cf. Jefferson & Clearfield Coal and Iron Co.), 913,996,999
Erysipelas, morbidity, 869,871
  in Sullivan county, 185
  in York county, 200
  mortality, 657,675,702,714,723
  in children under two (by days, weeks, months, 624,630,636,642
Espy, (cf. Scott Twp.), typhoid fever, 355,1275
Estes, Dr. W. L., dispensary physician, 25
Etna, births, 757,780,806,831,855
  mortality, 650
  sewerage permits, 945,955
Everett, tuberculosis dispensary, 22
  status of the Board of Health, 222
Examinations, made in the laboratory, 438
Exeter, water supply, 1086,1091
  notified to enforce sanitary regulation, 1220
  sewerage permits, etc., 945,954
Exhibit, (cf. Tuberculosis Traveling Exhibit).
Exophthalmic Goitre, (cf. Goitre, Thyroid Body).
Expenditures, 1380
Experimental Station (cf. Division of Laboratories, etc.)
Exposure, (cf. Cold as a cause of death).
Extension Water Co., water works (permit, sources), 921,935
External causes of death (cf. suicide, homicide, traumatism), 669,670, 687,688,720,721,729,730
  in children under two years (by days, weeks, months), 625,631,637,643
  deaths and death rates (1906-1910), 604
Extract of Tubercle Bacilli, (cf. Tubercle Bacilli Products).
Eyes and their annexa, diseases of the, as cause of death, 662,680,717,725
Eye affections, in rural school children, 45,72

Faeces, examination in the laboratories, 438,446
  in poliomyelitis, 464
Fairchance, sewerage permits, etc., 945,953
  water works, (permit, sources), 921,935
Fair Oaks Land Co. (cf. Leet Twp.); sewerage permits, etc., 940,945,950,955
Fairview, status of Board of Health, 223
Fairview Township, Water supply, 921
Fairview Water Co., water works (permit, sources), 921,935
Falk, Dr. H. S., C. M. I., for Cameron County, 7

Page.

- Falk, Dr. H. S., abstract of report, 116
  - dispensary physician, 23
- Falkowsky, Dr. C., dispensary physician, 24
- Fall, as the cause of death, 671,689,721,730
- Falling Springs Water Supply, 1095
  - and the Wyoming Valley epidemic, 1115
- Fallowfield Township, water supply, 921
- Falls Creek, report of the Division of Sanitary Engineering on the outbreak of typhoid fever, 1342
  - typhoid fever morbidity (1909-1910) by months, 1348
  - water works, (permit, sources, etc.), 911,921,935,1344,1346
- Farnsler, Dr. H. A., dispensary physician, 23
- Farwell, Absalom, water works (permit, sources), 921,934
- Fat, removal (extraction) from bacilli; (technique), 514
- Fawn Grove, status of Board of Health, 230
- Fayette County, County Medical Inspector, 7
  - Township Health Officers, 11
  - abstract of reports of County Medical Inspector, investigation of communicable diseases, and regulation of dairies because of them, 138,201
  - summary of reports of health officers, 204
  - report of dairy inspections, 207,210,213
  - notes of Boards of Health, 225
  - tuberculosis dispensaries, 24
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 282,294
  - smallpox, 238,240,243
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 769,795,821,847,863
  - rural mortality, 654,695,705,711,741
- Fearnot, typhoid fever in, 331
- Ferguson Township, water supply, 921
- Ferndale, water supply, 921
- Ferrous sulphate (see Iron).
- Fever, (cf. the various kinds).
- Field Inspection, report on, 1007
- Filter permits and decrees for water, 938
- Filters, used in the purification plants for public water supplies, 999,1002
- Financial report, fifth annual, 1380
- Findley, Dr. Joseph D., C. M. I., for Blair County, 7
  - abstract of report, 100
  - dispensary physician, 22
- Finleyville, Board of Health reorganized, 230
- Fire, as a cause of death, (cf. burns, conflagration).
- Firearms, (cf. Homicide), traumatism by, as a cause of death, 670,689 721,730
  - gunshot wounds, fatalities for five years, 622
  - treatment with antitoxin, 598-600
  - suicide by, 669,688,721,730
- Fisher, Dr. P. P., C. M. I., for Mercer County, 7
  - abstract of report, 162
  - dispensary physician, 25
- Fits, (cf. Convulsions, Epilepsy).
- Fleming, Thomas, Jr., assistant engineer, 38,897
- Fleshings of hides, research on the presence of *B. anthracis*, 447,520
- Flies (cf. Musca Vomitoria), notes on their relation to typhoid fever, 1220,1230,1240,1241
- Flowers, Dr. C. B. J., dispensary physician, 23
- Flynn, Dr. J. G., C. M. I., for Elk County, 7
  - abstract of report, 137
  - dispensary physician, 24
- Fogelman, Dr. A. P., dispensary physician, 22
- Foltz, Dr. J. C., dispensary physician, 26
  - tuberculosis classes, 430
- Food, poisoning by, as a cause of death, (cf. poison), 670,688,721

Page.

- Forbes, Charles R., assistant engineer, 38,898,900
- Ford City, sewerage permits, 945,955
- Forest County, County medical inspector, 7
  - Township Health Officers, 11
  - abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 140,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 207,210,213
  - notes on Boards of Health, 225
  - tuberculosis dispensary, 24
  - tuberculosis mortality rates for five years, 620
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 770,795,821,846,863
  - rural mortality, 654,695,705,711,741
- Forest City, births, 758,780,806,832,855
  - mortality, 650
  - sewerage permits, etc., 945,950,955
- Formaldehyde, amount used by Health Officers, 68,204
  - amount supplied, 1378
  - observations on, in connection with poliomyelitis, 477,506
- Forty Fort, water supply, 1087,1091
  - typhoid fever, 1115,1212
  - notified to enforce sanitary regulations, 1220
- Forty Fort Water Company, 1087
- Fox, Dr. George H. bacteriologist at Mont Alto Sanatorium, 5,18
- Fox, Dr. Herbert, Chief of the Laboratories, 17
  - report, 435
  - participates in the investigation of diarrhoeal conditions at Chester, 233
  - (with D. Rivas and J. B. Rucker, Jr.), studies (epidemiological, pathological, etc.), of the Epidemic of Anterior Poliomyelitis in Eastern Pennsylvania in 1910, 447,456
  - research on the staining properties of degreased Tubercle Bacilli, 447,513
  - experiments showing change in tubercle bacillus extract, No. 10, by age, 447,519
  - examinations of old cultures of tubercle bacilli, 447,524
  - (with J. B. Rucker, Jr.), study of an epidemic resembling dysentery at Chester, 447,524
- Foxburg Water supply, 921
- Foxburg Water Works Co., (permits, sources), 921,937
- Fractures (cause not specified), as a cause of death, 672,690,722,731
- Francine, Dr. A. P., Dispensary Physician, 26
  - tuberculosis classes, 430
- Frank (cf. Markle).
- Frankford, dispensary (cf. Philadelphia).
- Frankfort, no Board of Health, 222
- Franklin County, County Medical Inspector, 7
  - Township Health Officers, 11
  - abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 140,201
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 225
  - tuberculosis dispensaries, 24
  - tuberculosis mortality, 617
  - rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 770,795,821,847,863
  - rural mortality, 654,695,705,711,741

Page.

- Franklin (Venango), tuberculosis dispensary, 26
  - births, 758,780,806,832,855
  - mortality, 650
  - smallpox, 242
  - Board of Health reorganized, 229
  - municipal water works (plant, sources, etc.) 913,921,937,996,999
  - sewerage permits, etc., 945,955
- Franklin (York), report of an inspection on account of suspected diphtheria, 349
- Franklin (York Co.), no Board of Health, 230
- Franklintown (York), no Board of Health, 230
- Free Hospital for Poor Consumptives (White Haven), sewage disposal plant, 9th,1005,1006
- Freeland, births, 758,780,806,832,855
  - mortality, 650
- Freeport, Water supply, 913,922,996,999
  - sewerage permits, etc., 910,945,955
  - Water Works Co., water works (permit, sources, plant etc.), 922,935,938,992,996,999
- Fretz, Dr. J., dispensary physician, 25
- Frontz, Dr. H. C., C. M. I., for Huntingdon Co., 7
  - abstract of report, 146
  - dispensary physician, 24
- Fry, Charles N., assistant (traveling tuberculosis exhibit), 21
- Fullerton, report on smallpox, 244
- Fullmer, Dr. C. L., dispensary physician, 23
- Funerals, restricted in cases of whooping cough and measles, 44
- Fulton County, County Medical Inspector, 7
  - Township Health Officers, 12
  - abstract of report of County Medical Inspector; investigation of communicable diseases and regulation of dairies because of them, 144,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 225
  - tuberculosis dispensary, 24
  - tuberculosis mortality rates for five years, 620
  - marriages, 885
  - rates (1906-1910), 887
  - rural births, 770,795,821,847,863
  - rural mortality, 654,695,705,711,741
- Furuncle, as a cause of death, 667,685,719,729

- Gable, Dr. Frank J., dispensary physician, 22
- Galeton, water supply, 922
- Galeton-Eldred Water Co., water works, (permit, sources), 922,937
- Gall stones (cf. Calculi).
- Gallitzin, report of an inspection regarding typhoid fever, 333
- Gangrene (cf. Lung).
- Gangrene, as a cause of death, 667,685,719,729
- Garbage as a nuisance, petition and complaints, 903
  - disposal plant at Mont Alto Sanatorium, 966
  - disposal in Wilkes-Barre, 1209
- Garcia, Alexander, assistant in the laboratories, 17,437
  - research on the morphological variations of tubercle bacilli in a tuberculous abscess, 447,517
- Gardner, Frank L., Assistant Engineer, 38,898
- Garrett, Board of Health inactive, 228
- Gases, absorption of deleterious, (conflagrations excepted) as a cause of death, 670,688,721,730
- Gaughan, Dr. M. C., dispensary physician, 25
- Gayley, Dr. W. C., dispensary physician, 24
- Gaysport, sewerage permits, etc., 945,955
- Geist, Dr. J. W., dispensary physician, 25

Page.
General Inspector, (cf. Charles W. Webbert).
Genital organs, female, cancer, etc., of, as cause of death, . . 659,677,715,724
Genitourinary system, non venereal disease of, as a cause of death (see also kidney, uterus, etc.), ... 604,622 665,666,684,718,719,727,728,744,747,751
German measles, morbidity, ... 869,871
in certain counties, ... 96,102,117,159,167,185
in rural school children, ... 45,72
Germicides, disapproval of the use, of chemical in the purification of drinking water, ... 57
Germicides (cf. lime compounds, copper sulphate) at plant at Lemoyne (Riverton Con. W. C.), ... 991
Gettysburg, tuberculosis dispensary, ... 22
water supply (see the Water Co. below).
Gettysburg Water Co., purification plant and operation, 913,992,996,999
Gibbs, James L. W., ... 39,898,901
Gift of a cottage at Cresson, ... 50
Gifts for Mont Alto Sanatorium, ... 371
Gilberton, births, ... 758,780,806,832,855
mortality, ... 651
water supply, ... 922
Gilberton-Schuylkill Water Co., water works, (permit, sources). 922,935
Gillespie, Miss Katharine, assistant visiting nurse, ... 20
in charge of district nursing in the epidemic at Woodland, ... 321
report, ... 329
Gilliland, Dr. S. H., member of Advisory Board, ... 4
Girardville, Sanitary Committee but no Board of Health, ... 228
water supply, ... 922
Girardville Water Co., water works, (permit, sources), ... 922,935
Gladehurst Water Co., water works, (permits, sources), ... 922,934
Gladfelter, P. H., water purification plant and operation, ... 992,997,1001
Glanders, ... 657,869
Glasgow, no Board of Health, ... 222
Glassport, births, ... 758,781,807,832,855
mortality by months, ... 651
sewerage permits, etc., ... 945,955
Glen Brook Water Co., water works, (permits, sources), ... 922,935
Glenburn, no Board of Health, ... 226
Glen Lyon, (Newport Twp.), water supply, ... 1112
Glen Mills School (cf. House of Refuge).
Glenolden, water supply, ... 922
sewage disposal plant, ... 910
Glen Rock, typhoid fever outbreak, report of the Engineers, . . . 1287
typhoid morbidity, (1905-1910), ... 1304
water supply, (permits, sources,) 7
ment), ... 922,937,1288,1307
Goitre, Exophthalmic, as a cause of death (cf. Thyreoid body) . . 659,677 715,725
Gonococcus infection, as a cause of death, ... 659,677,715,724
Gordon (cf. Citizens Water Co.), water supply, ... 922
Gouldsboro, no Board of Health, ... 226
Graham Twp., typhoid fever morbidity (1910), by months, ... 1327
Grand Valley, status of Board of Health, ... 229
Gravel Hill Water Supply Co., water works, (permit, sources, etc.), ... 909,911,922,935
Graves, Dr. E. A., dispensary physician, ... 23
Graves's disease (cf. Goitre).
Gray's Landing, smallpox, ... 240,243
Great Bend, water supply, ... 922
Green, Dr. Edgar M., C. M. I. for Northampton Co., ... 7
abstract of report, ... 170
dispensary physician, ... 25
Green Lane, no Board of Health, ... 227

Page.
Green Tree, sewerage permits, etc., 945,950,952
Greencastle, water works (permits, sources, etc.), 909,911,922,934
Greene County, County Medical Inspector, 7
Township Health Officers, 12
abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 145,202
summary of reports of Health Officers, 204
report of dairy inspections, 208,211,213
notes on Boards of Health, 225
tuberculosis dispensary, 24
tuberculosis mortality rates for five years, 620
poliomyelitis, 294
smallpox, 240,243
marriages, 885
rates, (1906-1910), 887
rural births, 770,795,821,847,863
rural mortality, 654,695,705,711,741
Medical Society, department represented at the annual meeting, address, 59
Greensboro, status of Board of Health, 225
Greensburg, tuberculosis dispensary, 27
births, 758,780,806,832,855
mortality, 651,693,698,703,709,739
typhoid death rate, 606
water supply, 922
Greenville, births, 758,780,806,832,855
mortality by months, 651
sewerage permits, etc., 945,950,952
Greenwood, water supply, 1095
Grooms, age, 883,888,889
dissolution of former marriages, 889
nativity, 888
quotity of marriage, 889
Grove City, sewerage (permits, etc.), 945,950,952,954
Grube, Dr. J. E., C. M. I., for Jefferson County, 7
abstract of report, 149
dispensary physician, 24
Gunshot wounds (cf. Firearms).
Guthrie, Dr. Donald, dispensary physician, 25
Guthrie, Dr. George W., member of Advisory Board, 4,42

Hæmorrhage, as a cause of death, 663,666.667,681,684,685,717,719,726,728
Hæmorrhoids, (cf. veins).
Hakes, Dr. S. P., C. M. I. for Tioga County, 7
abstract of report, 187
dispensary physician, 26
Hallstead, water supply, 922
sewerage permits, etc., 945,952
Hallstead Water Co., water works, (permit, sources), 922,935
Hamburg Sanatorium, purchase of land for, 51
work done by Engineering Division, 989
Hamilton, John (cf. State College), sewerage permits, etc., 944,951,954
Dr. S., (dispensary physician, 22
Township (Monroe), water supply (Saylorsburg Village), 922
Township (McKean), water supply, 922
Hamilton Water Co., water works, (permits, sources), 922,937
Hanging or strangulation, suicide by, 669,687,720,729
Hanna, Walter S., assistant engineer, 38,898
Hanover (cf. Hanover Sewer Co.), tuberculosis dispensary, 27
births, 758,781,807,833,855
mortality, 651
water supply, 922
Hanover Village (Nanticoke), water supply, 1114

Page.
Hanover Township (Lehigh), (cf. Homœopathic State Hospital sewerage permits, 945
  Township (Luzerne), water supply, 1087,1107
  typhoid fever, 1115,1212
Hanover Water Co. (Luzerne Co.), 1087,1088
Hanover and McSherrystown Water Co., water works, (permit, sources), 922,937,938
Hanover Sewer Co. (York Co.), sewage disposal plant, etc., 916,945 952,1005
Harbor Creek Township (cf. Erie Improvement Company), sewerage permits, 945
Harris, Dr. C. M., dispensary physician, 23
  Dr. Geo. F., C. M. I. for Centre County, 7
    abstract of report, 118
    dispensary physician, 23
Harris Township, water supply, 922
Harrisburg, tuberculosis dispensary, 23
  births, 758,781,807,833,855
  mortality, 615,693,698,703,709,714,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  special report of inspection of dairies because of typhoid fever, 306
  Municipal Water Works, (permits, sources, plant, etc.), 909,911,913,922,935,938,992,996,1000
  (cf. Penna. State Lunatic Hospital and Suburban Drainage Co.), sewerage permits, etc., 910,945,955
Harrison Twp., water supply, 922,997,1000
  (cf. Natrona Village), sewerage permits, etc., 945,952
  no Board of Health, 221
Hartman, Dr. L. M., dispensary physician, 27
  Dr. Paul A., C. M. I. for Dauphin County, 7
    abstract of report, 131
    dispensary physician, 23
Hartzell, Charles, superintendent of Division of Supplies, 42
  report, 1378
Harvey's Creek, as a water supply, 1111
  and the epidemic in Wyoming Valley, 1115,1130
  treated with copper sulphate, 1112
Harvey Lake, condition and relation to the outbreak of typhoid fever in the Wyoming Valley, 1131
Harveys Lake Water Supply Co., 1088
Hastings, tuberculosis dispensary, 23
  sewerage permits, etc., 910,945,951,954
Haven, Dr. J. A., dispensary physician, 24
Haverford Township (cf. Beechwood Park Amusement Co. and Haverford College), water supply, 922
Haverford College sewage disposal plant (permits, etc.), 916,945,951,1005
Hawthorn, status of Board of Health, 224
Hazle Township, water supply, 922
Hazleton, tuberculosis dispensary, 24
  births, 759,781,807,833,855
  mortality, 651,693,698,703,709,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  water supply, 922
  sewerage permits, etc., 945,954
Hazleton Water Co., water works, (permits, sources), 922,937
Hazlett, Dr. E. M., dispensary physician, 27
Headings, Dr. I. G., dispensary physician, 24
Health, a National Department of, correspondence concerning, 55
  conditions in rural communities, address at Rural Progress Conference, 58
  as an investment, an address, 56
  Laws, violations examined or prosecuted, 217
  Officers, township, 8,218
  work of, 48,68,204,217,902

Page.

Hearing, in rural school children, ... 45,72

Heart disease (or congenital defect), as a cause of death, ... 621,662 668,680,717,720,726,729,743,747,750

in children under two years, by days, weeks, months, 624,630,636,642

Heat, effects of, as a cause of death, ... 671,690,721,731

Heidelberg Township, water supply, ... 922

Heidelberg Water Co. (Schaefferstown Village), water works, sources), water works (permit, sources), ... 922,934

Hellam, status of Board of Health, ... 230

water supply, ... 922

Hellam Water Co., water works, (permit, sources), ... 922,934

Hellam Twp., water supply, ... 922

Heller, Dr. S. H., dispensary physician, ... 24

Hempfield Twp., water supply, ... 923

Herman, Dr. Percival, special Inspector of Dispensaries, ... 21

Herina (cf. Intestinal obstruction), as a cause of death, ... 665,683 708,718,727,744,747,750

Herriot, Dr. F. E., dispensary physician, ... 22

Hershey, M. S., water works, (permit, sources), ... 923,934

Hides, research of the presence B. *anthracis* in the fleshings of, ... 447,520

Hilbert, Dr. J. A., dispensary physician, ... 25

Hill, Dr. G. P., dispensary physician, ... 23

Dr. Walter de la M., C. M. I. for Bedford County, ... 7

abstract of report, ... 95

dispensary physician, ... 22

Hiller, Dr. Hiram M., C. M. I. for Delaware Co., ... 7

abstract of report, ... 133

dispensary physician, ... 23

report on typhoid fever in Wayne, ... 351

Hillsgrove, malaria (laboratory report), ... 438

Hockenberry, Dr. H. D., C. M. I. for Butler Co., ... 7

abstract of report, ... 114

dispensary physician, ... 23

Hodgkin's disease (cf. Leuchaemia).

Hogan, Dr. W. C., C. M. I. for McKean Co., ... 7

abstract of report, ... 161

dispensary physician, ... 25

Holidaysburg, sewerage permits, etc., ... 945,955

Holmesburg, water supply, ... 913

Home Water Co. (Newport), water works (permit, source, plant, etc.), ... 925,937,938,997,1000

Home Water Co. (Royersford), purification plant and operation, 997,1001

Homestead, tuberculosis dispensary, ... 22

births, ... 759,781,807,833,855

mortality, ... 651,693,698,703,709,739

tuberculosis mortality, ... 616,619

typhoid death rate, ... 606

Homicides, ... 622,672,690,721,731

Homœopathic State Hospital for the Insane near Allentown, Lehigh Co., sewage disposal plant (permits, etc.), 915,945,948,951,1006

Honesdale, tuberculosis dispensary, ... 27

water supply, ... 923,1241

typhoid fever morbidity (1905-1910), ... 1244

outbreak of typhoid fever in a suburb, ... 1240

Honesdale Consolidated Water Co., water works, (permit, sources), ... 923,935

history and operation, ... 1241

Honesdale Water Co., history, etc., ... 1241

Hooker, Paul, assistant engineer, ... 38,897,900,1071,1080

Hookworm (cf. Ankylostomiasis, Uncinariasis).

Hopbottom, no Board of Health, ... 229

Hopewell, Board of Health, ... 223

Twp., typhoid fever morbidity in 1910, by months, ... 1286

(cf. Jones & Laughlin Steel Co., Woodlawn), sewerage permits, ... 945

Page.
Horner, H. M., water works, (permit, sources), 923,935
Dr. M. V., dispensary physician, 27
Hospital, Emergency, for the epidemic at Lime Ridge, 359,360,1273
House of Refuge, Girls' Department, Darlington, Delaware Co., sewage disposal plant (permits, etc.), 916,946,951,1006
Houser, Dr. P. W., dispensary physician, 26
Houston, status of Board of Health, 229
Houtzdale, water supply, 923
sewerage permits, etc., 910,946,951,952
Houtzdale Water Co., water works, (permit, sources), 923,937
Howard Tannery, Columbus Twp., Warren Co. (near Corry), sewage disposal plant, (permits, etc.), 916,946 951,1005,1006
waste disposal investigated, 991
Huber, Miss Ivy, auditor, 6
Hughestown, water supply, 1086,1096
notification concerning administration of health regulations, 1220
Borough Water Co., 1086
Hughesville, sewerage permits, 946,954
Hulings, Clark W., special inspector, 5,6,218
Hummelstown, water supply, 913,923,996,1000
Hummelstown Consolidated Water Co., water works, (permit, sources, plant, etc.), 923,935,938,992,996,1000
Hunger (cf. Nutrition, Starvation).
Hunt, Dr. Charles Jack, associate Chief Medical Inspector, 66
special reports concerning epidemics and various investigations; inspection of an outbreak of typhoid fever at Mahaffey, Clearfield county, 314
inspection at Irvona, Clearfield county, on account of typhoid fever, 316
inspection at Wiconisco, Dauphin county, on account of diphtheria, 319
report of inspection on account of typhoid fever at Woodland, Clearfield county, 321
inspection of Williams Twp., Dauphin county, on account of typhoid fever, 330
inspection at Gallitzin, Cambria County, on account of typhoid fever, 333
inspection at Lewisberry, York county, on account of scarlet fever, 335
inspection at Warrington Twp., York county, on account of typhoid fever, 338
inspection at Dallastown, York county, on account of whooping cough, 342
inspection at Rutherford Station on account of typhoid fever, 345
inspection at Reade Twp., Cambria county for determining the character of an eruption in a case of acute poliomyelitis, 347
inspection at Franklin, Franklin Twp., York county, on account of suspected diphtheria, 349
takes part in the dairy inspection because of typhoid fever in Harrisburg, 311
Huntingdon County, County Medical Inspector, 7
Township Health Officers, 12
abstract of report of County Medical Inspector; investigation of communicable diseases and regulation of dairies because of them, 146,202
summary of reports of Health Officers, 204
report of dairy inspections, 208,211,213

Page.
Huntingdon County, notes on Boards of Health, 225
  tuberculosis dispensary, 24
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 885
  rate (1906-1910), 887
  rural births, 770,795,821,847,863
  rural mortality, 654,695,705,711,741
Huntingdon, tuberculosis dispensary, 24
  births, 759,781,807,833,855
  mortality, 651
  water supply, 913,923,996,1000
  sewerage permits, (cf. Penna. Industrial Reformatory), etc., 946,954
Huntingdon Water Supply Co., water works, (permits, sources, plants, etc.), 923,935,938,992,996,1000
Hutchinson, Dr. W. L., dispensary physician, 24
Hyatt, Dr. F. C., physician to Mont Alto Sanatorium, 18
Hydatid Tumor of the liver as a cause of death, 665,683,718
Hyde Park, no Board of Health, 230
Hydetown, no Board of Health, 224
Hydrocephalus (cf. Malformations), as a cause of death, 668,686,720,729
Hydrophobia (cf. Rabies).
Hypochlorite of lime, (cf. Calcium).
Hyskell, Dr. W. E., dispensary physician, 23

Iams, Dr. John T., C. M. I. for Greene County, 7
  abstract of report, 145
  dispensary physician, 24
Ice Cream (cf. ice, milk), study of relation to certain outbreaks of typhoid fever, 355,1206,1230,1269
Ice supplies, examinations in certain outbreaks of typhoid fever, 1208,1230 1264
Ice supply (pollution, etc.), petitions and complaints, 903
Ice supplies, water shed inspection, 1016
Icterus, as a cause of death, grouped with congenital debility.
Immunization, with diphtheria antitoxin, 531
  with tetanus antitoxin, 598
Impetigo Contagiosa, in Lehigh county, 155
Inanition, (cf. Starvation, Marasmus, Nutrition).
Independence Twp. (cf. Avella), typhoid fever morbidity, by months, 1286
Indian mortality (see also color), urban, 733,738
  rural, 734,740
Indiana County, County Medical Inspector, 7
  Township Health Officers, 12
  abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 148,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Board of Health, 226
  tuberculosis dispensary, 24
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 885
  rate (1906-1910), 887
  rural births, 770,795,821,847863
  rural mortality, 654,695,705,711,741
Indiana, tuberculosis dispensary, 24
  births, 759,781,807,833,856
  mortality, 651
  death rate, tuberculosis of the lungs (1900-1909), 615
  water supply, 913,923,996,1000,1006
  sewage disposal plant, (permits, etc.), 915,946,951

Page.

- Industrial wastes (cf. iron waste), petitions and complaints concerning water pollution, etc., 903
- Infant morbidity, in Wilkes-Barre, by months, (1908,1910), 1222
  - mortality, 54,604,656,668,669,720,729
    - special tabulation and discussion (for deaths from certain diseases of children under two years, by days, weeks, months), 622,624,630,636,642
    - address on, at the Annual Meeting of the Medical Society of the State of Pennsylvania, 58
    - American Association for the Study and Prevention of, Department represented at meeting of the, and statistics presented, 59
- Infantile paralysis, (cf. Poliomyelitis).
- Influenza, mortality, 657,675,702,714,723,743,747,750
  - in children under two years, by days, weeks, months, 624,630 636,642
- Injury (at birth, etc.), as a cause of death, (cf. Infant mortality, external causes, homicide, suicide, etc.)
- Inkerman Village, water supply, 1102
- Insects, (see also Flies), present during epidemics of poliomyelitis, 461
- Inspection, (cf. Dairy Inspection, School Inspection, etc.)
- Inspectors, Associate Chief Medical, (cf. B. Franklin Royer, C. J. Hunt), Chief Medical, (cf. A. B. Moulton, B. Franklin Royer); County Medical, (cf. County); General, (cf. C. W. Webbert); Medical, of Dispensaries, (cf. T. H. A. Stites); Sanitary, 39,900,901
  - School Medical, 68
  - Special Medical, (cf. J. A. Bouse, C. W. Hulings); Special (Dispensaries), (cf. P. Herrman, J. P. Reynolds); of water filters, 41
- Instruments, Cutting or piercing, as a cause of death, (cf. homicide, suicide), 671,689,721,730
- Intestinal parasites, as a cause of death, 665,683,718
- Intestine, Disease, Obstruction, etc. (cf. Hernia), mortality, 665,683,718,727
- Intestine, Cancer, etc., of the peritonaeum, intestines, rectum, as a cause of death, 659,677,715,724
- Iron sulphate, use in the purification plants for public water supplies, 999
- Iron waste disposal, 991
- Irvona, Board of Health organized, 120
  - report on an outbreak of typhoid fever, 316
- Irwin, Ralph E., assistant engineer, 38,898 900, 991, 1023, 1034, 1053,1080, 1223, 1241, 1278, 1282, 1288, 1303, 1330, 1342, 1348,1352
- Irwin, water supply, 923
- Iselin, water supply, 913,996,1000
- Ivyland, status of Board of Health, 222

- Jacks Mountain Water Co., water works, (permit, sources), 923,937
- Jackson Twp. (Cambria), water supply, 923
- Jackson Twp. (Lebanon), water supply, 923
- Japanese mortality (see also color), urban, 733,738
  - rural, 740,740
- Jameson, Dr. W. B., dispensary physician, 25
- Jamestown, status of Board of Health, 227
- Jeanette, births, 759,781,807,833,856
  - mortality, 651
  - water supply, 923
  - sewerage permits, etc., 910,946,951,952

Page.

- Jefferson County, County Medical Inspector, 7
  - Township Health Officers, 12
  - abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 149,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 226
  - tuberculosis dispensaries, 24
  - tuberculosis mortality rates for five years, 620
  - Poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 770,795,821,847,863
  - rural mortality, 654,695,705,711,741
  - Commissioners, (cf. Pine Creek Twp.), sewerage permits, etc., 910,946,952
- Jefferson, No Board of Health, 230
- Jefferson Twp. (Greene), report of the Engineering Division on typhoidal conditions, 1351
- Jefferson Twp. (Greene), typhoid morbidity by months, 1353
- Jefferson Twp. (Washington), typhoid fever morbidity for 1910, by months, 1286
- Jefferson and Clearfield Coal and Iron Co., water purification plant and operation, 992,996,999
- Jenkins Twp., water supply, 1086,1091
  - typhoid fever, 1115,1212
- Jenkins Twp. Water Co., 1086
- Jenkintown, tuberculosis dispensary, 25
  - water supply, 923,996,1000
- Jenkintown Water Co., water works (permit, sources), 911,923,937
- Jennerstown, Board of Health organized, 228
- Jersey Shore, births, 759,781,807,833,856
  - mortality, 651
- Jessop, Dr. Roland, dispensary physician, 27
- Jewish Sanatorium for Consumptives, (cf. Philadelphia).
- Johnson, Dr. Fred. C., medical director of Mont Alto Sanatorium, 18
  - report, 365
- Johnsonburg, water supply, 923
  - sewerage permits, etc., 946,955
- Johnston, Dr. A. R., C. M. I. for Perry County, 7
  - abstract of report, 172
  - dispensary physician, 25
- Johnstown, tuberculosis dispensary, 23
  - births, 759,781,807,833,856
  - mortality, 651,693,698,703,709,723,739
  - tuberculosis mortality, 616,619
  - typhoid death rate, 606
  - water supply, 923
- Johnstown Water Co., water works (permit, sources), 923,935
- Joints, disease of the, (tuberculosis and rheumatism excepted) as a cause of death, 667,686,719,729
- Jones, Mrs. B. F., presents her cottage at Cresson, 50
- Jones cottage, at Cresson Sanatorium, 975
- Jones and Laughlin Steel Co., Water works (permit, sources), 923,934
  - (cf. Hopewell Twp.), sewerage permits,, etc., 946,951,955
- Jonestown, (cf. Lebanon Valley Consolidated Water Supply Co.), status of Board of Health, 226
- Jordan, Dr. R. R., dispensary physician, 23
- Josephine Water Co., water works (permit, sources), 923,934
- Josephine Furnace and Coke Co., (cf. Burrell Twp.), sewerage permits, etc., 946,952

Page.
Juniata County, County Medical Inspector, 7
Township Health Officers, 12
abstract of report of County Medical Inspector, investigation for communicable diseases and regulation of dairies because of them, 149,202
summary of reports of Health Officers, 204
report of dairy inspections, 208,211,213
notes on Boards of Health, 226
tuberculosis dispensary, 24
tuberculosis mortality rates for five years, 620
marriages, 885
rate (1906-1910), 887
rural births, 770,795,821,847,863
rural mortality, 654,695,705,711,741
Juniata, births, 759,782,808,833,856
mortality, 651
water works (permits, sources), 923,935
Kane, tuberculosis dispensary, 25,402
births, 759,782,808,834,856
mortality, 651
sewerage, permits, etc., 946,951,954
Karns City, No Board of Health, 223
Keene, Dr. C. E. L., dispensary physician, 23
Kennedy, Dr. J. P., dispensary physician, 24
Kennedy, Dr. L. T., C. M. I. for Schuylkill Co., 7
abstract of report, 174
dispensary physician, 26
Kenworthy, Dr. Wm. B.,C. M. I. for Pike Co., 7
abstract of report, 173
dispensary physician, 26
Khedive (Greene), typhoid fever, 1351
Kibler, Dr. C. B., dispensary physician, 24
Kidneys, disease of, (cf. Genitourinary System, Nephritis, etc.), as a cause of death, 666,684,718,727
Kilbuck Twp., (cf. W. Penna. Hospital for the Insane, and Ben Avon Heights Sewer Co.), sewerage permits, 946
Kingston, births, 759,782,808,834,856
mortality, 651
water supply, 1087,1109
typhoid fever, 1115
notified to enforce sanitary regulations, 1220
sewerage permits, etc., 946,951,955
Kingston Twp., typhoid fever, 1115,1212
water supply, 923
Kingston Water Co., 1087
Kinber, Dr. John, physician to Mont Alto Sanatorium, 18
Kinzer, Dr. H. C., dispensary physician, 24
Kittanning, tuberculosis dispensary, 22
water supply, (see also Armstrong Water Co. and Citizens Water Co.), 913,923,996,1000
sewerage permit, etc., 946,955
Kline, Dr. W. D., dispensary physician, 24
Knipe, Dr. D. R., dispensary physician, 25
Knox Twp., typhoid fever morbidity by months, 1349
Knoxville, births, 759,782,808,834,856
mortality, 651
water works (permit, sources), 923,934
sewerage permit, etc., 946,952
Koenig, Dr. Adolph, Member of Advisory Board, 4,42
acting County Medical Inspector for Allegheny Co., 86
dispensary physician (pro tem.), 22
Koppel Land Co.,, (cf. Big Beaver Co.), sewerage permits, etc., 946,951,952
Koronski, Dr. Royal A., bacteriologist to Mont Alto Sanatorium, 5,18,372
Labor, Accidents of, causing death, (cf. Puerperal state), 667,685,719,728

Page.
Laboratories and Experimental Stations, Division of, 17
  report, 435
Laboratories, Branch for study of poliomyelitis, 282
Lackawanna County, County Medical Inspector, 7
  Township Health Officers, 12
  abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 157,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Boards of Health, 226
  tuberculosis dispensaries, 24
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 885
  rate (1906-1910), 887
  rural births, 770,795,822,847,863
  rural mortality, 654,695,705,711,741
  typhoid fever morbidity by months, also urban and rural, 1220-1222
Lackawanna Twp., water supply, 1086
Lacy, Dr. H. C., physician to Mt. Alto Sanatorium, 18
Laflin, water supply, 1086,1102
  notified to enforce health regulation, 1220
Laflin Water Co., 1086
Lake Twp., (Luzerne), typhoid fever, 1212
Lancaster County, County Medical Inspector, 7
  Township Health Officers, 12,13
  abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 150,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Boards of Health, 226
  tuberculosis dispensaries, 24
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 282,294
  marriages, 885
  rate (1906-1910), 887
  rural births, 771,796,822,847,853
  rural mortality, 654,695,706,711,741
  medical inspection of school children in rural districts, 45,72
Lancaster, tuberculosis dispensary, 24
  births, 759,782,808,834,856
  mortality, 651,693,698,703,709,723,739
  poliomyelitis, (spot map), 284
  tuberculosis mortality, 619
  typhoid death rate, 606
  municipal water works (permits, sources, plants, etc.), 913,992,996,1000
Landscape Architect, (cf. E. L. Lee).
Landslide as a cause of death, 671,689,721,730
Lansdowne, water supply, 923
  sewerage permits, plant, etc., 910,946,951,952,954
Lansford, tuberculosis dispensary, 23
  births, 760,782,808,834,856
  mortality, 651
  water supply, 923
  sewerage permit, etc., 946,955
Laporte, no Board of Health, 228
  water supply, 923
Large, Dr. Charles P., C. M. I. for Somerset Co., 7
  abstract of report, 184
  dispensary physician, 26

Page.
Largeman, Dr. Samuel, physician to Mont Alto Sanatorium, 18
Larksville, Active Board of Health, 227
  births, 760,782,808,834,856
  mortality, 651
  water supply, 1087,1109
  typhoid fever, 1115,1212
  letter to council concerning Board of Health, etc., 1218
Larynx, disease of, as a cause of death, (cf. cancer), 663,681,717,726
Lathrop, Dr. H. B., C. M. I. for Susquehanna Co., 7
  abstract of report, 186
Latrobe, water supply, 923
  births, 760,783,809,834,856
  mortality, 651
Latrobe Water Co., water works (permit, sources), 911,923,935
Laurel Run, water supply, 1087,1107
  no Board of Health, 1214
  letter to council thereon, 1216
Lawrence County, County Medical Inspector, 7
  Township Health Officers, 13
  abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 153,202
  summary of monthly reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Boards of Health, 226
  tuberculosis dispensary, 24
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 885
  rate (1906-1910), 887
  rural births, 771,796,822,848,863
  rural mortality, 654,695,706,711,741
Lawrence Twp., typhoid fever morbidity by months, 1327
Lead poisoning, chronic, as a cause of death, 660,678,716
Lebanon County, County Medical Inspector, 7
  Township Health Officers, 13
  abstract of reports of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 154,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Boards of Health, 226
  tuberculosis dispensary, 24
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 885
  rate (1906-1910), 887
  rural births, 771,796,822,848,863
  rural mortality, 654,695,706,711,741
Lebanon, tuberculosis dispensary, 24
  births, 760,783,809,835,856
  mortality, 651,693,698,703,709,739
  tuberculosis mortality, 619
  typhoid death rate, 606
  water works (permit, sources, etc.), 923,937,938
Lebanon Valley Consolidated Water Supply Co., water works (permit, sources, etc.), 909,911,923,935,938
Leckie, Dr. J. W., dispensary physician, 24
Lee, Dr. Benjamin, assistant to commissioner, 6
Lee, Miss Elizabeth Leighton, landscape architect, 5,6
Lee Mine, (Newport Twp.), water supply, 1112
Leechburg, status of Board of Health, 221
  water supply, 995,999
Leet Twp., substitute for a Board of Health, 221
  (cf. Fair Oaks Land Co.), sewerage permits, 946
Leffler, Dr. W. H., dispensary physician, 22

Page.
Lehigh County, County Medical Inspector, 7
Township Health Officers, 13
abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 154,202
summary of reports of Health Officers, 204
report of dairy inspections, 208,211,213
notes on Board of Health, 226
tuberculosis dispensary, 24
tuberculosis mortality, 617
rates for five years, 620
poliomyelitis, 272,282,294
marriages, 885
rate (1906-1910), 887
rural births, 771,796,822,848,863
rural mortality, 654,695,706,711,741
Lehigh County Commissioners, (cf. S. Whitehill Twp.), sewerage disposal plant (permits, etc.), 910,946,951
Lehigh County Home and Almshouse, near Allentown, sewage disposal plant, 915,1006
Lehigh Valley and County, poliomyelitis, 282
Lehigh Water Co., water works (permit, sources, etc.), 911,923,937,938
Lehighton, births, 760,783,809,835,856
mortality, 651
sewerage permit, etc., 910,946,951,952
Lehr, Dr. M. D., dispensary physician, 23
Lemoyne, water supply, 923,991
Lenhartsville, Board of Health organized, 222
Leprosy, 657,869
LeRaysville, Board of Health appointed, 222
Leuchaemia, as a cause of death, (cf. Anaemia), 660,678,715,725
Lewisberry, status of Board of Health, 335
report on an epidemic of scarlet fever, 335
Lewisburg, sewerage permits, etc., 946,950,954
Lewistown, tuberculosis dispensary, 25
births, 760,783,809,835,856
mortality, 651
sewerage permit, etc., 946,950,954
Lewisville, Board of Health, 228
Lightning, as a cause of death, 672,690,721
Ligonier, sewage disposal plant, 946,950,952
Lime, Hypochlorite of, chlorinated, (cf. Calcium).
Lime Ridge, reports on an epidemic of typhoid fever, 354,360,1268
Little Meadows, No Board of Health, 229
Little Wilkes-Barre Mountain range, as a water supply, 1113
and the epidemic in Wyoming Valley, 1115,1133
Littlestown, refuses to organize a Board of Health, 221
Liver, disease of, as a cause of death, (cf. Cancer), 665,683,718,726,727 744,747,751
cancer of stomach, liver, as a cause of death, 659,677,715,724
Livermore, status of Board of Health, 230
Liverpool, Board of Health organized, 228
Lobar Pneumonia, (cf. pneumonia).
Lock Haven, tuberculosis dispensary, 23
births, 760,783,809,835,856
mortality, 651
Locomotion, Organs of, disease of, as a cause of death, (cf. bones), 667,668, 685,686,719,729
Locomotor Ataxia, as a cause of death, 661,679,716,725
Logan Twp., water supply, 923
Loganville, no Board of Health, 230
Londonderry Water Co., water works (permit, sources), 937
Long, Dr. J. M., dispensary physician, 22

Page.

- Long Branch, no Board of Health, 229
- Loretto, Board of Health inactive, 223
- Low, Myron I., and wife, philanthropically active during the epidemic at Lime Ridge, 359,360,361,1273
- Lower Allen Twp., water supply, 923
- Lower Chichester Twp., water supply, 923
- Lower Heidelberg Twp., (cf. State Asylum for the Chronic Insane), sewerage permits, 946
- Lower Merion Twp., water supply, 924
  - sewerage permit, etc., 946,950,953
- Lower Providence Twp., (cf. Phila. Jewish Sanatorium at Eaglesville), sewerage permits, 946
- Lower Towamensing Twp., (cf. New Jersey Zinc Co.), sewerage permits, 946
- Lowry, Dr. W. J., dispensary physician, 24
- Loysville, diphtheria at the Tressler Orphanage, 237
- Lues, (cf. Syphilis).
- Lung, Gangrene of the, as a cause of death, 663,682,717,727
  - symbols used in recording condition, 373
  - tuberculosis of, as a cause of death, tables and discussions, (cf. tuberculosis), 613,614,615,658,676,702,715,724,743,747,750
  - in children under two years, by days, weeks, months, 624,630,636,642
- Luzerne County, County Medical Inspector, 7
  - Township Health Officers, 13
  - abstract of reports of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 159,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 227
  - tuberculosis dispensaries, 24,25
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 771,796,822,848,864
  - rural mortality, 654,695,706,711,741
  - typhoid fever morbidity by months, also urban and rural, 1220-1222
- Luzerne County Central Poor District, hospital for insane and almshouse, water works (permit, sources), 924,937
- Luzerne, births, 760,783,809,835,857
  - mortality, 651
  - water supply, 1087,1109
  - typhoid fever, 1115,1212
  - letter to council concerning Board of Health, etc., 1218
- Luzerne Water Co., 1087
- Lycoming County, County Medical Inspector, 7
  - Township Health Officers, 13
  - abstracts of reports of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 161,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 227
  - tuberculosis dispensary, 25
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 771,796,822,848,864
  - rural mortality, 655,695,706,712,741
- Lykens, tuberculosis dispensary, 23
  - reports of investigations concerning epidemics of scarlet fever, 247,259,266

Page.

Lymph, Vaccine, supplied in 1910, 584

Lymphatic System, disease of, (Lymphangitis, etc.), (cf. Spleen), as a cause of death, 663,681,717,726

Lymphoma, (cf. Sarcoma).

Lynch, Dr. H. P., physician to Mont Alto Sanatorium, 18,372

McAdoo, sewerage permits, etc., 946,950,954

McAneny, Dr. J., dispensary physician, 23

MacAskie, H. L., technical assistant, 437

McCarthy, Dr. F. P., physician at Mont Alto Sanatorium, 372

McCauley, Dr. E. S. H., C. M. I. for Beaver County, 7,66
  dispensary physician, 22

McClure, H. M., (cf. Selinsgrove), sewerage permits, 946,953

Macungie, Water works (permit, sources), 924,937

McConnellsburg, tuberculosis dispensary, 24
  Board of Health, 225

McConnon, Dr. G. H., dispensary physician, 25

McCreary, Dr. J. H., dispensary physician, 22

McDowell, Dr. H. F., dispensary physician, 26

McGirk, Dr. C. E., dispensary physician, 23

McIlhaney, Dr. W. H., dispensary physician, 25

McKean County, County Medical Inspector, 7
  Township Health Officers, 13
  abstract of report of C. M. I., investigation on account of communicable diseases and regulation of dairies because of them, 161,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Boards of Health, 227
  tuberculosis dispensaries, 25
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 885
  rate (1906-1910), 887
  rural births, 771,796,823,848,864
  rural mortality, 655,695,706,712,741

McKee, Dr. G. F., dispensary physician, 22

McKee, Dr. T. N., C. M. I. for Armstrong County, 7
  abstract of report, 87
  dispensary physician, 22

McKeesport, tuberculosis dispensary, 22
  births, 760,783,809,835,857
  mortality, 651,693,703,709,723,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  municipal water works (permits, sources, plant, etc.), 913,924
  935,938,992,996,1000
  sewage permits, etc., 946,955

McKeesport Academy of Medicine, address at annual meeting of, 58

McKees Rocks, births, 761,783,809,835,856,857
  mortality, 651,693,698,703,709,739
  typhoid death rate, 606
  water supply, 924

McKown, Dr. H. L., C. M. I. for Wyoming County, 7
  abstract of report, 199
  dispensary physician, 27

McMullen, Dr. J. W., dispensary physician, 23
  physician at Mont Alto Sanatorium, 18,372

McNail, Dr. J. M., dispensary physician, 22

McSherrystown, concerning a Board of Health, 85,221
  water supply, (cf. Hanover), 924

Machines, traumatic death, caused by 671,689,721,730

Madera Water Co., water works (permit, sources), 924,934

Mahaffey, typhoid fever, 314

Mahanoy City, births, 761,783,809,835,857
  mortality, 651,693,698,703,709,739
  tuberculosis mortality, 606,615,619
  typhoid death rate, 606

Page.
Mahanoy City Water Co., water works (permits, sources), ... 924,934
Mahon, John M., Jr., assistant engineer, ...38,898,900
Mahoning Township, (cf. State Hospital at Danville), sewerage permits, ... 946
Malaria, morbidity, ... 869,871
  mortality, ...656,674,702,714,723,743,746,750
  laboratory examinations, ... 438
Malformations or deformities in rural school children, ... 45,72
Malformation, mortality, ...604,668,686,720,729
  in children under two years, by days, weeks, months, ...624,630,636,642
Malignant tumors, included under Cancer q. v.
Malone, Dr. C. M., dispensary physician, ... 25
Malvern, (cf. Rush Hospital).
Mamma, (Mammary Gland, (cf. Breast).
Mamma, (guinea pig, rabbit) effect of products of tubercle bacilli, 451
Mann, Dr. C. H., dispensary physician, ... 25
Manchester Township, water supply, ... 924
Manns Choice, Board of Health organized, ... 222
  tannery waste disposal investigated, ... 991
Manor, water supply, ... 924
Manorville, council acts as Board of Health, ... 221
  sewerage permits, etc., ... 946,954
Mansfield, sewerage permit, etc., ... 946,952
Manslaughter, (cf. Homicide).
Mapleton, water supply, ... 924
Maps made or revised, ... 907
Marcus Hook, Board of Health reorganized, ... 225
  water supply, ... 924
  sewerage permits, etc., ...946,950,951,954
Marcy Township Water Co., ... 1086
Marianna, Board of Health organized, ... 230
  water supply, ... 924
Marianna Water Co., water works (permits, sources), ... 924,935
Marie Water Co., water works (permit, sources), ... 924,935
Marietta, water supply, ... 924
Marietta Gravity Water Co., water works (permit, sources), .. 924,935
Mark, Coleman B., ...39,898,900
Markle and Frank, (cf. Uniontown), sewerage permits, etc., ... 946,952
Marklesburg, no Board of Health, ... 225
Marks, Dr. W. G., physician to Mont Alto Sanatorium, ... 18
Marple Township, water supply, ... 924
Marriage Statistics, sub-division of, ... 41,54
  report, ... 881
  marriage rates (1906-1910), ... 883
  marriages by months and counties, ... 884
  percentage by months, ... 889
  quotity, ... 889
  dissolution of former, of brides and grooms, . 889
Mars, Board of Health reorganized, ... 223
  water works (permit, sources), ... 924,934
  sewerage permits, etc., ...910,946,950,951
Marshall, Dr. Clarence J., member of Advisory Board, ... 4
Marshall, Dr. J. P., physician at Mont Alto Sanatorium, ... 18
Martindale Water Co., water works (permit, sources), ... 924,935
Maryland State Sanatorium inspected, ... 254
Maryland (State), typhoid death rate (1909-1910), ... 606
Masontown, reports on smallpox, ... 241,243
  water works (permits, sources, etc.), ...909,911,924,935,938
  sewerage permit, etc., ... 946,950
Massachusetts (State), typhoid death rate, (1909-1910), ... 606
  tuberculosis of the lungs, death rate (1900-1909), ... 615
Massachusetts Sanatoria inspected, ... 251,255
Masterton, Lee, member of Advisory Board, ... 4,42

Page.

Matamoras, water supply, ... 924

Matamoras Citizens Water Co., water works (permit, sources), 924,934

Maternity, by months, urban and rural, ... 753
  by age and nativity, urban and rural, ... 774
  by nativity and by quotity of the child, urban and rural, 800,826
  illegitimate, by nativity, urban and rural, ... 852

Matrons of Mont Alto Sanatorium, ... 18

Matthews, Dr. William E.,C. M. I. for Cambria County, ... 7
  abstract of report, ... 114
  dispensary physician, ... 22

Mauch Chunk, tuberculosis dispensary, ... 23

Mauch Chunk, (cf. Upper Mauch Chunk), water supply, ... 924

Mauch Chunk Township, water supply, ... 924

Mauch Chunk Township Water Co., water works permit, ... 924

Maulfair, Dr. H. E., dispensary physician, ... 24

Maxwell, Dr. T. M., dispensary physician, ... 23

Mayfield Yards (Citizens), (cf. Carbondale Twp.), sewerage permits, etc., ...946,950,954

Meadville, Board of Health negligent, ... 125
  tuberculosis dispensary, ... 23
  births, ...761,783,809,835,857
  mortality, ...651,693,698,703,709,739
  tuberculosis mortality, ... 619
  typhoid death rate, ... 606
  sewerage permit, etc., ... 946,955

Measles, (cf. German measles).

Measles, morbidity, see also abstracts of reports of C. M. I. for the various counties), ... 869,871
  mortality, ...611,656,674,702,714,723,743,746,750
  in children under two years by days, weeks, months, 624,630, 636,642
  cases examined by County Medical Inspectors on report of Health Officers, ... 67
  summary of inspections by County Medical Inspectors, 201
  reports on the epidemic at Wiconisco, ...53,259,266,319
  report of an inspection concerning an epidemic in Williamstown, ... 245
  in rural school children, ... 45,72
  funeral restrictions in case of, ... 44

Mechanicsburg, (Indiana), Board of Health (?), ... 226

Mechanicsburg, (Cumberland), water supply, ...913,924,996,1000

Mechanicsburg Gas & Water Co., water works (permit, sources, plant, etc.), ...924,937,938,992,996,1000

Media, municipal water works, ...914,992,996,1000

Medical Association or Societies, (cf. Cumberland Valley, Northampton County, McKeesport Acad. of Med., Yough Valley).

Medical Association (see American Medical Association).

Medical Society of the State of Pennsylvania, address at annual meeting, ... 58

Medical Directors, (cf. Mont Alto Sanatorium), inspectors, (cf. inspectors).

Medical Inspection, division of, ... 6,44,65
  of school children in rural districts, ... 44,68

Meisenhelder, Dr. E., dispensary physician, ... 27

Meningitis, (cf. Cerebrospinal fever, and meningitis).

Meningitis, as a cause of death, ... 613,658
  660,661,676,678,679,702,715,716,724,725,743,747,850
  in children under two years, by days, weeks, months, 624,630, 636,642

Mental disease (other than Paralysis, Cerebral haemorrhage, etc., q. v.), as a cause of death, ...661,679,716,725

Page.

- Mercer County, County Medical Inspector, 7
  - Township Health Officers, 13,14
  - abstract of reports of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 162,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 227
  - tuberculosis dispensary, 25
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 771,797,823,848,864
  - rural mortality, 655,695,706,712,741
- Mercer, sewerage permit, etc., 946,950,954
- Methylene blue in use in sewage disposal plants, 1005
- Meyersdale, tuberculosis dispensary, 26
- Middle Paxton Township, water supply, 924
- Middletown, births, 761,784,810,835,857
  - mortality, 651
  - water supply, 914,924,997,1000
- Middletown Township, (Delaware Co.), (cf. House of Refuge, Penna. Training School, and Williamson Free School), sewerage permits, 946
- Middletown Drainage Company, (Dauphin), sewerage permit, etc., 946,954
- Middletown and Swarata Consolidated Water Co., water works (permit, sources, etc.), 924,935,938,994,997,1000
- Midvale, water supply, 1102
- Midway, Board of Health organized, 229
- Mifflin County, County Medical Inspector, 7
  - Township Health Officers, 14
  - abstract of reports of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, 164,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Board of Health, 227
  - tuberculosis dispensary, 25
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 771,797,823,849,864
  - rural mortality, 655,695,706,712,741
- Mifflinburg, tuberculosis dispensary, 26
- Mifflintown, tuberculosis dispensary, 24
- Milesburg, no Board of Health, 223
- Milford, tuberculosis dispensary, 26
- Milford Township, water supply, 924
- Miliary fever, 657
- Miliary tuberculosis, Acute, (cf. tuberculosis), mortality, 613,658, 676,715,724
- Milk, circular on the care and management of dairy farms, 75
  - production and handling, (cf. abstracts of C. M. I. reports, and dairies), inspection, 201,205,206,212
  - examinations in the laboratories, 438,441
  - research on its behavior after injection of human tubercle bacilli into cows, 455
  - possible relation to poliomyelitis, 273
  - given to dispensary patients, 398,399
  - studies of its relation to the epidemics, 351,355,1121,1135,1205, 1213, 1220, 1232, 1240, 1263, 1269, 1274, 1278, 1281, 1284, 1311
  - possible relation to infant morbidity in Wilkes-Barre (1908-1910), 1222

Page.
Millbourne, Board of Health organized, 225
Mill Creek Township, (cf. Erie Improvement Company), sewerage permits, 946
Miller, Dr. E. B., dispensary physician, 22
Miller, Dr. J. S., C. M. I. for York County, 7
  abstract of report, 200
  dispensary physician, 27
Miller, Dr. W. G., dispensary physician, 25
Millersburg, Water supply, 925
Millersburg Home Water Co., water works (permit, sources), 925,937
Millerstown, Board of Health, 172,228
Millvale, births, 761,784,810,836,857
  mortality, 651
  sewerage permit, etc., 946,950,954
Millville, sewerage permit, etc., 946,952
Milnesville Water Co., water works (permit, sources), 925,937
Milton, tuberculosis dispensary, 25
  births, 761,784,810,836,857
  mortality, 651
  sewerage permits, etc., 946,950,951,954
Mines, (cf. Traumatism), injury therein as a cause of death, 622,671,689 721,730
Mine waste water, research on its effect on B. *anthracis* and B. *coli*, 447,521
Miner, Dr. Charles B., C. M. I. for Luzerne County, 7
  abstract of report, 159
  dispensary physician, 25
  special activities, 1084, seq.,1223
Miners, Mills, water supply, 1087,1091
  typhoid fever, 1115,1212
  notified to enforce sanitary regulations, 1220
  sewerage permit, etc., 946,950,954
Miners Mills Water Co., 1087
Minersville, births, 761,784,810,836,857
  mortality, 651
  epidemics, 180
  water supply, 925
  sewerage permit, etc., 946,953
Minersville Water Co., water works (permit, sources), 925,935
Minooka, (Lackawanna), water supply, 1086,1095
Minooka Water Co., 1086
Mokoma Spring Water Co., water works (permit, sources), 925,937
Monaca, sewerage permit, 947,954
Monessen, tuberculosis dispensary, 27
  births, 761,784,810,836,857
  mortality, 651,693,698,703,709,739
  typhoid death rate, 606
  water supply, 914,925,997,1000
  sewerage permits, etc., 947,955
Monessen Water Co., water works (permit, sources, plant, etc.), 911,925, 936,938,997,1000
Monongahela, tuberculosis dispensary, 27
  sanitary supervision, 229
  births, 761,784,810,836,857
  mortality, 651
  water supply, 912,997,1000
Monongahela City Water Co., purification plant and operation, 997,1000
Monongahela Valley Water Co., plant and operation, 995,999
Monroe County, County Medical Inspector, 7
  Township Health Officers, 14
  abstract of reports of C. M. I., investigation of communicable disease and regulation of dairies because of them, 166,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213

Page.

- Monroe County, notes on Boards of Health, 227
  - tuberculosis dispensary, 25
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 771,797,823,849,864
  - rural mortality, 655,695,706,712,741
- Monroe, (Bradford), water supply, 925
- Monroe Twp., (Snyder), water supply, 925
- Mont Alto Sanatorium, staff and employees, 18
  - report, 365
  - comments of Prof. Egger, 49
  - work done by the Div. of San. Engineering (water works, etc.), 956
  - sewage disposal plant, 915,1005
  - report on the use of tubercle bacilli products, 585
- Montgomery County, County Medical Inspector, 7
  - Township Health Officers, 14
  - abstract of reports of C. M. I., investigation of communicable diseases and regulation of dairies because of them, 167,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 227
  - tuberculosis dispensaries, 25
  - tuberculosis mortality, 618
  - rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 771,797,823,849,864
  - rural mortality, 655,696,706,712,741
- Montgomery, sewerage permit, 947,955
- Months, statistically, and birth, 753
  - and diphtheria, 609,875
  - infant mortality by days, weeks, months, 624,630, 636,642
  - marriage, 884,889
  - measles, 611
  - mortality, 650
  - scarlet fever, 610,877
  - tuberculosis, 613,879
  - typhoid fever, 607,874
  - whooping cough, 612
- Montour County, County Medical Inspector, 7
  - Township Health Officers, 14
  - abstract of reports of C. M. I., investigation of communicable diseases and regulation of dairies because of them, 168,202
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 208,211,213
  - notes on Boards of Health, 227
  - tuberculosis dispensary, 25
  - tuberculosis mortality, 617
  - rates for five years, 620
  - poliomyelitis, 294
  - marriages, 885
  - rate (1906-1910), 887
  - rural births, 771,797,823,849,864
  - rural mortality, 655,696,706,712,741
- Montrose, tuberculosis dispensary, 26
- Moore, Dr. Jesse D.,C. M. I. for Lawrence County, 7
  - abstract of report, 153
  - dispensary physician, 24

Page.

- Moore Water Co., permits, 911,925,936
- Moosic, water supply, 1086,1091
  - typhoid fever, 1115,1212
  - Board of Health inefficient, 1213
  - letter concerning this, 1214
- Moosic Water Co., 1086
- Morbidity Statistics, sub-division of, report, 867
- Morbidity for infant diseases in Wilkes-Barre by months, (1908-1910), 1222
- Morbidity, communicable diseases, 869,870
- Morbilli, (cf. measles).
- Moreland Township, water supply, 925
  - sewerage permit, (cf. Bryn Athyn Village Asso.), 947
- Moreland Spring Water Co., water works (permit, sources, operation, etc.), 909,911,914,925,937,938,992,996,1000
- Morgantown, (W. Va.), smallpox source, 238
- Morganza, (cf. Penn Reform School), sewerage permits, etc., 910,947
- Morrellville and Cambria Boroughs Water Co., water works (permit, sources), 925,937
- Morris Twp., typhoid fever morbidity (1910), by months, 1327
- Morrisville Rubber Works, sewage disposal plant, 915,1005
- Morse, Wilbur, secretary to commissioner, 6
- Mortality, general and special, 603,614,702,708,714,723
  - months, quarters, 604,649
  - by age periods, 605,692,743,746,750
  - and sex, 605,653
  - of infants, 54
  - of infants under two, by days, weeks, months, 624,630,636,642
  - rural death rates in general and influence of neighboring municipalities, 618
  - by groups of diseases, (1906-1910), 604
- Moses, Howard E., assistant engineer, 38,898,900,1249,1288
- Mosser, Dr. J. W., C. M. I. for Fulton County, 7
  - abstract of report, 144
  - dispensary physician, 24
- Moulton, Dr. Arthur B., Chief Medical Inspector, 6,66
- Mt. Carmel, tuberculosis dispensary, 25
  - births, 761,784,810,836,857
  - mortality, 651,693,698,703,709,739
  - tuberculosis mortality, 619
  - typhoid death rate, 606
  - sewerage permits, etc., 947,950,951,955
- Mt. Gretna Park (cf. S. Londonderry Twp., Lebanon Co.), sewage plant, (permits, etc.), 910,916,947,950,951,1005,1006
- Mt. Jewett, Board of Health, reorganized, 227
- Mt. Joy., epidemic of typhoid fever, engineering report, 1278
  - water supply, 1278
- Mt. Oliver, sewerage permit, etc., 947,950,955
- Mt. Pleasant, tuberculosis dispensary, 27
  - births, 761,785,811,836,857
  - mortality, 651
  - seewerage permits, etc., 910,947,950,954
- Mt. Sterling, smallpox, 238,241
- Mt. Union water supply, 925
  - sewerage permits, etc., 910,947,950,954
- Mt. Union Water Company, water works (permit, sources), 925,936
- Mountain Brook Water Co., 1087
- Mountain Water Supply Co., relation to the outbreak of typhoid fever at Scottdale, 1057
- Mountville, water works, (permit, sources), 925,934
- Mouse, tumors of the, research on the effect of taurin, 447,508
- Mouth and annexa, Disease of, as a cause of death, (cf. Buccal cavity), 664,682,717,727

Page.
Mowery, Dr. J. L., C. M. I. for Lancaster county, ... 7
    abstract of report, ... 150
    dispensary physician, ... 24
    and the epidemic at Mt. Joy, ... 1278
Moylan, water supply, ... 996,1000
Muhlenberg, Dr. Heister, dispensary physician, ... 22
Muhlenberg Township, water supply, ... 925
Mumps, morbidity (cf. abstracts of reports of C. M. I. by counties) 869,871
    in rural school children, ... 45,72
Muncy, Board of Health, ... 217
    water supply, ... 991
    rural progress conference, ... 58
Munford, Dr. S. A., dispensary physician, ... 26
Munhall, births, ... 761,785,811,837,857
    mortality, ... 651
Murder, (cf. Homicide).
Murphy, Dr. E. J., dispensary physician, ... 26
Murphy, Dr. F. A., dispensary physician, ... 26
Musca vomitoria, larvae in the faeces, ... 446
Muscles, (cf. Organs of Locomotion, Rheumatism).
Musser, Dr. W. S., dispensary physician, ... 22
Mycoses (cf. Actinomycosis), mortality, ... 657,675,715
Myers, Dr. H. F., dispensary physician, ... 24
Myerstown Water Company, water works, (permit, sources), ... 911,925,
937,938

Nanticoke, tuberculosis dispensary, ... 25
    Board of Health, ... 1218
    births, ... 762,785,811,837,857
    mortality, ... 651,693,698,703,709,739
    tuberculosis mortality, ... 616,619
    typhoid death rate, ... 606
    typhoid fever, ... 1115,1212
    water supply, ... 1088,1112
    sewerage permit, ... 947,954
Nanticoke Water Co., ... 1088
Nant-y-Glo, water supply, ... 925
    Water Company (uninc.), water works, (permit,
    sources), ... 925,936
Narberth, water supply, ... 926
    sewerage permit, etc., ... 947,950,952
Nasal Fossae, disease of, as cause of death, ... 663,681,717,726
National Association for the Study and Prevention of Tuberculosis,
    annual meeting department represented, ... 57
    report of representative, ... 431
Nativity of patients of the Dispensaries, ... 414
    of patients of Mont Alto Sanatorium, ... 365,379
    384,385,387,390,391,395,396
    and marriage, ... 888
    and maternity, ... 752,774,852
    and morbidity, ... 874-880
    and mortality, ... 732,733,735,736,738,740
Natrona, water supply, ... 914
Natrona Water Co., water works, (permit, sources, etc.), ... 925,937
938,992,997,1000
Nectar, necatoriasis, (cf. Ankylostomiasis).
Neglect, as a cause of death in infants, ... 669,720,729
Negro mortality (see also color), urban, ... 733,736,738
    rural, ... 734,737,740
Nelson Valve Company (Springfield Twp., Montgomery), sewage
    disposal plant, ... 910,916,1005
Nephritis as a cause of death, ... 622,666,684,708,718,727,744,747,751
Nervous system, disease of, as a cause of death (cf. hæmorrhage,
    Meningitis, etc.), ... 604,621,660,662,678,680,716,717,725

Page.

- Nescopeck, Board of Health, 1239
  - outbreak of typhoid fever, report of Division of Sanitary Engineering, 1223
  - typhoid fever morbidity, (1906-1910), 1225
  - water supply, 925,1235,1237
- Nescopeck Water Supply Co., water works, (permit, sources) 925,937,1235
- Ness, Daniel V., 39,901,1080
- Neufeld, Dr. M. A., dispensary physician, 23
- Neuralgia (and neuritis) as a cause of death, 661,680,717,725
- Neville Township, water supply, 925
- New Bethlehem, water supply (cf. Citizens Water Co.), 914,925,997,1000
- New Bloomfield, tuberculosis dispensary, 25
  - water supply, 925
- New Brighton, births, 762,785,811,837,857
  - mortality, 652
- New Buffalo, no Board of Health, 228
- New Castle, tuberculosis dispensary, 24
  - births, 762,785,811,837,858
  - mortality, 652,693,698,703,709,723,739
  - tuberculosis mortality, 619
  - typhoid death rate, 606
  - water supply, 914,997,1000
  - sewerage permits, etc., 947,950,951,954
- New Castle Township, water supply, 925
- New Castle Water Co., permits, plant, etc., 925,992,997,1000
- New Chester Water Co., water works, (permits, sources, plant, etc.), 936,938,992,995,999
- New Columbus, no Board of Health, 227
- New Cumberland, water supply, 925
- New Hampshire, (State), typhoid death rate, (1909-1910), 606
- New Haven (cf. Connellsville), 1330,1336
- New Jersey (State) typhoid death rate (1909-1910), 606
  - tuberculosis of the lungs, death rate (1900-1909), 615
  - inspection of Pennsylvania sources of ice supply, 1007
- New Jersey Zinc Company (Palmerton, Carbon Co.), (cf. L. Towamensing Twp.), sewage disposal plant, (permits, etc.), 916,947 951,1005,1006
- New Kensington, births 762,785,811,837,858
  - mortality, 652
  - sewerage permits, etc., 947,952
- New Oxford, (cf. New Oxford Drainage Co.), sewerage permits, 947
- New Oxford Drainage Co., sewerage permits, etc., 947,951
- New Salem, no Board of Health, 230
- New Wilmington, sewage disposal plant, (permits, etc.), 915,947 950,954,1006
- New York (State), typhoid death rate, (1909-1910), 606
  - tuberculosis of the lungs death rate (1900-1909), 616
- New York Sanatorium at Otisville, inspected, 250
- Newburg (Clearfield), no Board of Health, 224
- Newburg (Cumberland), status of Board of Health, 224
  - notified to enforce sanitary regulations, 1220
- Newport, water supply, (cf. Home Water Co.), 914,925,997,1000
  - sewerage permits, etc., 947,950,955
- Newport Township (see also Luzerne County Central Poor District), water supply, 1088,1112
  - typhoid fever, 1115,1212
- Newspapers as an aid to the work of the Department, 62
- Nickel, Dr. J. Edward, physician to Mont Alto Sanatorium, 18
- Night soil disposal in Wilkes-Barre, 1209
- Night soil dumpage, petitions and complaints, 903
- Niles, Dr. R. G., dispensary physician, 24

Page.
Norristown, tuberculosis dispensary, ... 25
    births, ...762,785,811,837,858
    mortality, ...652,693,698,703,709,723,739
    tuberculosis mortality. 617,619
    typhoid death rate, ... 606
    water supply, ...914,997,1001
    sewerage permits, etc. (cf. State Hospital for Insane), 910,947
Norristown Insurance and Water Co., water works, (source and operation, ...909,997,1001
North Annville Water Supply Co., water works (permit, sources, etc.), ...909,911,925,936
North Bethlehem, Poliomyelitis, ... 272,277
North Annville Township, (cf. Annville Twp.), water supply, ... 925
North Braddock, births, ...762,785,811,837,858
    mortality, ...652,693,698,703,709,739
    typhoid death rate, ... 606
    water supply, ... 925
    sewerage permits, etc., ... 947,954
North Charleroi, water supply, ... 925
    sewerage permit, etc., ... 947,952
North Cornwall Township, water supply, ... 925
North Cornwall Water Supply Co., water works, (permit, sources, etc.), ...910,911,925,936
North Coventry Township, water supply, ... 926
North East, municipal water supply, ...914,926,937,938,997,1001
    sewerage permit, etc., ...911,947,950,952
North Huntingdon Township, water supply, ... 926
North Irwin Township, water supply, ... 926
North Lebanon Township, water supply, ... 926
North Londonderry Township, water supply, ... 926
North Mountain Water Supply Co., ... 1088
North Reading, Mass., State Sanatorium examined, ... 251,257
North Springfield Water Co., permit, ... 914
North Versailles Township, water supply, ... 926
Northampton County, County Medical Inspector, ... 7
    Township Health Officers, ... 14
    Abstract of report of C. M. I.; investigation of communicable diseases and regulation of dairies because of them, ... 170,202
    summary of report of Health Officers, ... 204
    report of dairy inspections, ...208,211,213
    notes on Boards of Health, ... 227
    tuberculosis dispensaries, ... 25
    tuberculosis mortality rates for five years, . 620
    poliomyelitis, ... 294
    marriages, ... 885
    rate (1906-1910), ... 887
    rural births, ...772,797,823,849,864
    rural mortality, ...655,696,706,712,741
Northampton County Medical Society, address at meeting of the, 58
Northampton, births, ...762,785,811,837,858
    mortality, ... 652
Northumberland County, County Medical Inspector, ... 7
    Township Health Officers (cf. Errata);
    abstract of reports of C. M. I.; investigation of communicable diseases and regulation of dairies because of them, ... 171,202
    summary of reports of Health Officers, 204
    report of dairy inspections, ...208,211,213
    notes on Boards of Health, ... 228
    tuberculosis dispensaries, ... 25
    tuberculosis mortality rates for five years, ... 620
    poliomyelitis, ... 294

Northumberland County, marriages, 885
  rate, (1906-1910), 887
  rural births, 772,797,823,849,864
  rural mortality, 655,696,706,712,741
Northumberland, sewerage permits, etc., 947,954
Norwich Township, water supply, 926
Norwood, water supply, 926
No. 606 in experiments with monkeys inoculated with poliomyelitis, 476,501
Nuisances, petitions and complaints, 903
Nuisances referred to special counsel for adjustment, 1369
Nurses (cf. K. Gillespie, A. M. O'Halloran), 401,404,405
  of the Dispensaries, 20,22,398
  of the Sanatorium, 18
Nutrition in rural school children, 45

Oak Lane, water supply, 926
Oakmont, water supply, 926
  sewerage permit, etc., 947,955
Occupation of patients of the Sanatorium, 380
  of patients of the dispensaries, 414
Occupational poisoning (except lead), as a cause of death (cf. Poisoning), 660,716
Oesophagus, disease of, as cause of death, 664,682,717,727
Ogontz Water Co., water works, (permit, sources), 911,926,937
O'Halloran, Miss Alice M., head visiting dispensary nurse, 20
  report concerning dispensaries, 405
  in charge of nursing in the epidemic at Lime Ridge, 359
  report thereon, 360
O'Hara Twp. (cf. Allegheny City Home; Allegheny County Work House; Aspinwall-Delafield Co.), sewerage permits, 947
Ohio (State), Typhoid death rate (1909-1910), 606
Ohio Valley Water Co., water works, (permit, sources), 926,934
Ohiopyle, needs a Board of Health, 139
  smallpox, 238
Oil City, tuberculosis dispensary, 26
  births, 762,785,811,837,858
  mortality, 652,693,698,703,709,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  sewerage permits, etc., 947,955
Oklahoma, water supply, 995,999
Old Age as a cause of death, 604,669,687,720,729,744,747,751
Old Forge, births, 762,786,812,837,858
  mortality, 652,693,698,703,709,739
  typhoid death rate, 606
Old Forge (formerly Rendham village), water supply, 1086,1091,1096
  typhoid fever, 1115,1212
  no Board of Health, 1213
  letter to council, 1214
Old Forge Borough Water Co., 1086
Oliver Twp., water supply, 926
Olyphant, births, 763,786,812,838,858
  mortality, 652
  sewerage permits, etc., 947,950,954
Orbisonia, status of Board of Health, 225
  water supply, 926
Orbisonia Water Co., water works, (permit, sources), 926,934
Organization of the Department, 6
Organization, sanitary, notes on Boards of Health by counties, 221
Orphans' Home, (cf. Penna. Sold. Orph. Ind. School, Tressler Orph. Home).
Osborne, no Board of Health, 221
  sewerage permits, etc., 911,947,950,954

Page.
Otisville (N. Y.), examination of tuberculosis hospital at, ... 250
Otorrhoea, (cf. Ear affections).
Otto, Harry A., ... 39,898,900
Ovary, Cysts, etc., of the, causing death (cf. Salpingitis), 666,684,719,728
Overbrook water supply, ... 926
Owen, Hon, Robert L., correspondence concerning a National Department of Health, ... 55
Oxford, water works, (permits, sources), ... 926,934

Paint, water supply, ... 926
Paint Twp., water supply, ... 926
Paisley (Cumberland Twp.), inspection of typhoidal conditions, 1353
Palmer Land Co., Palmerton (cf. Lower Towamensing Twp.), sewage disposal plant (permits, etc.), ... 916,947,950,1005,1006
Panther Valley Water Co., water works (permits, sources), ... 926,936
Paralysis (unspecified) as a cause of death, (cf. Cerebral hæmorrhage, etc., see also Poliomyelitis), ... 661,679,716,725
  general, of the insane, as a cause of death, ... 661,679,716,725
  of animals during the epidemic of poliomyelitis, ... 459,476
Parasites, (cf. intestinal parasites, uncinariasis).
Paresis, (cf. paralysis, general, of the insane),
Parker, Dr. B. F., dispensary physician, ... 27
Parkesburg, water supply, ... 927
Parkesburg Water Co., water works, (permit, sources), ... 927,934
Parkside Hotel, Willow Grove, Montgomery Co., sewage disposal plant, ... 916,1005
Parnassus, sewerage permit, etc., ... 947,952
Parsons, water supply, ... 1087,1091,1098
  typhoid fever, ... 1115,1212
  notified to enforce sanitary regulation, ... 1220
  sewerage permit, etc., ... 947,950,954
Parsons Water Co., ... 1087
Pathology, (cf. division Laboratories, etc.), ... 17
Pathological fluids and growths examined in the Laboratory, 438,441
Patterson Heights, sewerage permit, etc., ... 947,952
Patton Twp., water supply, ... 927
Paxtang Village, water supply, ... 927
Paxtang Consolidated Water Co., water works, (permit, sources), 927,934
Peirson, Henry W., Chief of Division of Distribution of Biological Products, ... 28
  report, ... 527
Pellagra, made a reportable disease, ... 43
  morbidity, ... 869
  mortality, ... 658,676,715
Penbrook water supply, ... 927
Penn water supply, ... 927
Penn Twp., (Allegheny), water supply, ... 927
Penn Twp., (Westmoreland), water supply, ... 927
Penn Twp., (York), water supply, ... 927
Pennsylvania Glue Co., Springdale, Allegheny Co., sewage disposal plant, (permits, etc.), ... 916,947,951,1005
Pennsylvania Industrial Reformatory, at Huntingdon, outbreak of typhoid fever—report of Division of Sanitary Engineering, ... 1249
  Water Works, (permit, sources, etc.), ... 911,927,937
  sewage disposal plant (permit, etc.), (cf. Huntingdon and Smithfield Twp.) 915,951 1006
Pennsylvania Reform School (Morganza), water works (permits, sources, plant, etc.), ... 914,930 937,938,992,1006
  sewage disposal plant (permits, etc.), (cf. Cecil Twp.), ... 915,951

Page.

Penna. Soldiers' Orphans' Industrial School, Scotland, Franklin Co., sewage disposal plant, 915
Pennsylvania State College, (cf. State College Borough, and John Hamilton), sewerage permits, etc., 948,954
Pennsylvania State Lunatic Hospital near Harrisburg, sewage disposal plant, (permits, etc.), 915,945,951,1006
Pennsylvania State Medical Society, (cf. Medical Society, etc.)
Pennsylvania State South Mountain Sanatorium for Tuberculosis, (cf. Mont Alto Sanatorium).
Pennsylvania Training School for Feeble Minded Children (cf. Middletown Twp.), sewerage permits, etc., 947,951
Pennsylvania Water Co., water works, (permits, sources, plants, etc.), 909,911,914,927,936,938,992,993,998,1001
Pennypack district—see Philadelphia.
Penrose, Dr. Charles B., member of Advisory Board, 4,42
Peoples Water Co. of Pittston, 1086
Peoples Water Co. of Scranton, 1086
Peoples Water Co. (Wilkes-Barre), 1087
Pericarditis, as a cause of death, (cf. Heart disease), 662,680,717,726
Peritonaeum, intestines, rectum, cancer of the, as a cause of death, 659,677,715,724
Peritonitis, simple (nonpuerperal) as a cause of death, 665,683,718,727
Perkasie, water supply, 927
  sewerage permits, etc., (cf. Philip Cressman), 947,1006
  Water Supply Co., water works, (permit, sources), 927,934
Permits and decrees, concerning water works, 917
  concerning sewerage and sewage disposal, 940
Perry, John E., assistant engineer, 38,898
Perry County, County Medical Inspector, 7
  Township Health Officers, 14
  abstract of reports of C. M. I.; investigation of communicable diseases and regulation of dairies, because of them, 172,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Boards of Health, 228
  tuberculosis dispensary, 25
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 885
  rate (1906-1910), 887
  rural births, 772,797,823,849,864
  rural mortality, 655,696,706,712,741
Perry Twp., water supply, 927
Pertussis, (cf. Whooping Cough.)
Petersburg, sewerage permit, etc., 947,952
Petitions and complaints concerning nuisances, pollutions, etc., 903
Pharynx, disease of the, as cause of death, 664,682,717,727
Philadelphia (City and County, conterminous), marriages, 885
  rate (1906-1910), 887
  births, 763,786,812,838,858
  mortality, 652,693,698,703,709,714,739,743
  of children under two years by days, weeks, months, 630
  tuberculosis mortality, 616,618,619
  typhoid death rate, 606
  tuberculosis dispensaries, 26
  poliomyelitis, 282,294
  spot map (and comparison with epidemic cerebrospinal meningitis of 1907-1908), 284
  water supply (plant and operation) (cf. Oak Lane, Overbrook), 914,927,992,996,997,1000,1001
  sewerage permits, 947,954
  sewage disposal plant, (permits, etc.), (cf. Pennypack district), 910,915,951,1006
Philadelphia College of Pharmacy, special lecture before the 57

Page.

Philadelphia Jewish Sanatorium for Consumptives, Eaglesville, Montgomery Co., (cf. Lower Providence Twp.), sewage disposal plant (permits, etc.), ... 916,947,951,1005
Philadelphia and Bristol Water Co., purification plant and operation, ... 996,1000
Philadelphia and Reading Railway, water supply at Rutherford Heights, ... 995,999
Philipsburg, tuberculosis dispensary, ... 23
Phillips, Dr. C. R., dispensary physician, ... 23
Phlebitis (cf. Veins).
Phlegmasia alba dolens, (embolus, sudden death), Puerperal, in mortality statistics, ... 667,685,719,728
Phoenixville, tuberculosis dispensary, ... 23
  births, ... 763,786,812,838,858
  mortality, ... 652,693,698,703,709,739
  tuberculosis mortality, ... 616,619
  typhoid death rate, ... 606
Physicians, (cf. County Medical Inspectors, Division of Medical Inspection, etc.), of the dispensaries, ... 22,403
  of the Sanatorium, ... 18,372
Pike County, County Medical Inspectors, ... 7
  Township Health Officers, ... 14
  abstract of reports of C. M. I.: investigation of communicable diseases and regulation of dairies because of them, ... 173,202
  summary of reports of Health Officers, ... 204
  report of dairy inspections, ... 208,211,213
  notes on Boards of Health, ... 228
  tuberculosis dispensary, ... 26
  tuberculosis mortality rates for five years, ... 620
  poliomyelitis, ... 294
  marriages, ... 885
  rate (1906-1910), ... 887
  rural births, ... 772,797,823,849,864
  rural mortality, ... 655,696,706,712,742
Pine Creek Twp.. typhoid fever morbidity, by months, ... 1349
  sewerage permit, (cf. Jefferson Co. Commissioners), ... 947
Pine Run, as a water supply, ... 1102
  and the Wyoming Valley epidemic, ... 1115,1128
Pitcairn, water supply, ... 927
  sewerage permits, etc., ... 947,954
Pittsburgh, tuberculosis dispensary, ... 22
  births, ... 763,786,812,838,858
  mortality, ... 652,693,698,703,709,714,739,746
  of children under two years, by days, weeks, months, 636
  tuberculosis mortality, ... 616,619
  typhoid death rate, ... 606
  poliomyelitis, ... 284
  water supply (municipal and operation), ... 914,927 936,938,997,1001
  sewerage permits, etc., ... 947, 954
Pittsburgh Chamber of Commerce, address before the, ... 56
Pittsburgh Water Works, sewage disposal plant at filter plant near Aspinwall, (permits, etc.), ... 916,947,951,1005
Pittsburgh Gas Coal Co., water purification plant and operation, ... 996,1000
Pittston, tuberculosis dispensary, ... 25
  births, ... 763,786,812,838,858
  mortality, ... 652,693,698,703,709,739
  tuberculosis mortality, ... 616,619
  typhoid death rate, ... 606
  water supply, ... 1086,1091

Page.
Pittston, typhoid fever, ...1115,1212
  letter to mayor concerning health ordinances, ... 1217
Pittston Township, water supply, ...1086,1091,1096
Pittston City Water Co., ... 1086
Pittston Water Co., ... 1086
Pittston Township Water Co., ... 1086
Placarding by Health Officers, ... 68,204
Plague, ... 657,869
Plains, water supply, ... 1102
Plains Twp. (Luzerne), water supply, ... 1087
  notified to enforce sanitary regulations, ... 1220
Plains Twp. Water Co., ... 1087
Plainsville water supply, ... 1102
  Water Co., ... 1087
Plank, Dr. E. R., dispensary physician, ... 23
Pleasant Valley, (cf. Avoca).
Pleasantville, water works, (permit, sources), ... 927,934
  sewerage permit, etc., ...910,947,952
Pleurisy, as cause of death, ...663,681,717,726
Plum Twp., water supply, ... 927
Plumbism (cf. Lead poisoning).
Plumville, Board of Health organized, ... 226
Plymire, Dr. I. Swartz, C. M. I. for Bucks Co., ... 7
  abstract of report, ... 106
  dispensary physician, ... 23
Plymouth, births, ...763,786,812,838,858
  mortality, ...652,693,699,704,709,739
  tuberculosis mortality, ... 616,619
  typhoid death rate, ... 606
  water supply, ...1087,1109
  typhoid fever, ...1115,1212
  letter to councils concerning Board of Health, ... 1218
Plymouth Township, water supply, ...927,1087,1112
  letter to Commissioners concerning Health regulations, ... 1219
Plymouth Water Co., ... 1087
Pneumonia, (cf. Bronchopneumonia), morbidity, ... 869,872
  mortality, ...621,663,681,708,717,726,743,747,750
  in children under two years, by days, weeks, months, 624,630 636,642
Poisoning, (cf. Alcohol, Food, Lead, Occupation), as a cause of death, ...660,670,678,688,716,721,725,730
Poison, suicide by, ...669,687,720,729
Poliomyelitis, acute anterior, morbidity statistics, ... 869,870
  mortality statistics, ...681,679,716,725
  to be reported, ... 43
  Department represented in a symposium at the College of Physicians of Philadelphia, ... 58
  general report of the epidemic of 1910, ... 271
  report from the laboratories upon investigations covering subjects of transmission, parasitology, pathology and bacteriology, ... 456
  report of an inspection in Reade Twp. to determine the character of an eruption (Ecthyma impetiginosum?) complicating a case, 347
Polk (cf. State Institution for Feeble Minded), sewerage permits, 947
Pollutions of water supplies, petitions and complaints, ... 903
Pollutions, stream pollution, water pollution and nuisances, referred to special counsel for adjustment, ... 1369
Poplar Grove, water supply, ... 1331
Population (mid-year) of Pennsylvania, (1906-1910), as used in estimation of death rates, etc., ... 603

Page.
Port Clinton, status of Board of Health, 228
Port Griffith, water supply, 1091
Port Matilda, sanitary conditions investigated, 218
Port Matilda, water supply, 927
Port Matilda Water Co., water works, (permit, sources), 927,934
Portland Water Co., water works, (permit, sources), 927,936
Port Royal, water supply, 927
Port Royal Water Co., water works (permit, sources), 927,934
Portage, water supply, 927
Portage Township, water supply, 927
Portersville, Board of Health organized, 223
Portland, water supply, 927
Portland Water Co., water works, (permit, sources), 927, 936
Portser, Dr. I. M., C. M. I. for Westmoreland Co., 7
  abstract of report, 197
  dispensary physician, 27
P. O. S. of A. Hall used as an Emergency Hospital in the epidemic at Lime Ridge, 359,360,1273
Potassium permanganate used, report of Health Officers, by counties, 204
  amount supplied, 1378
Potter County, County Medical Inspector, 7
  Township Health Officers, 14
  abstract of reports of C. M. I., investigation of communicable diseases and regulation of dairies because of them, 173,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 208,211,213
  notes on Boards of Health, 228
  tuberculosis dispensary, 26
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 282,294
  marriages, 885
  rate (1906-1910), 887
  rural births, 772,797,824,849,864
  rural mortality, 655,696,706,712,742
Pott's disease, (cf. tuberculosis), as a cause of death, 613,658,676,715,724
Pottstown, tuberculosis dispensary, 25
  births, 763,787,813,839,858
  mortality, 652,693,699,704,709,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  water supply, 914,927,997,1001
Pottstown Gas and Water Co., water works (permit, source, plant, etc.), 927,936,938,997,1001
Pottsville, status of Board of Health, 299
  tuberculosis dispensary, 26
  diphtheria, 180,299
  births, 763,787,813,838,858
  mortality, 652,693,699,704,709,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  sewerage permits, etc., 947,952
Poulton, water supply, 995,999
Pregnancy, Accidents of, causing death, (cf. Puerperal state), 667,685,719
Prematurity, (cf. Birth, Infancy).
Premises placarded, quarantined, disinfected, report of Health Officers by counties, 204
Preston, smallpox, 249
Price, Dr. D. L., dispensary physician, 26
Pringle Twp., water supply, 1087,1109
Prosecution, on account of neglect of departmental regulations, 217,338,342
  of a foreign corporation for the fraudulent practice of medicine, 218
  in cases referred to special counsel for final settlement, 1369

Page.
Prospect Park, water supply, ... 927
Prostata, disease of the, as a cause of death, ...666,684,719,728
Psychoses, (cf. Mental disease).
"Ptomain" poisoning, (cf. Food poisoning).
Press, public, co-operation of the, ... 62
Puerperal fever, morbidity, ... 869,872
Puerperal state, as a cause of death, (cf. Pregnancy), ...604,685,708,719
728,744,747,751
Pulmonary Congestion, Pulmonary Apoplexy, as a cause of death, ...663,681,717,727
Pulmonary Tuberculosis, (see Tuberculosis).
Punxsutawney, tuberculosis dispensary, ... 24
births, ...763,787,813,839,858
mortality, ... 652
water supply, ...914,927,997,1001
sewerage permits, etc., ... 947,955
Punxsutawney Water Co., water works (permit, sources, etc.), ...927,937,938,992,997,1001
Purchasing, division of, accounting and, ... 42,1379
Purulent Infection (& Septichaema, q. v.), as a cause of death, ...657,675,715,723
Putts, Dr. B. Swayne, Deputy Medical Director of Mont Alto Sanatorium, ... 18
report of cases treated by tubercle bacilli products at Mont Alto, ... 374
Pyne village, (Taylor), water supply, ... 1096
Quarantine, circular concerning, ... 74
report of, ... 68,204
prosecutions concerning neglect of, ... 217,338
Quarry accidents, (cf. Traumatism), causing death, ...671,689,721,730
Quarryville, report of the Division of Sanitary Engineering concerning an outbreak of typhoid fever and condition of the water supply, etc., ... 1354
water supply, ... 927
Quarryville Water Co., water works (permit, sources, etc.), ...910,911,
912,927,937,938,1368
history and operation and relation to the epidemic of typhoid fever, ...1355,1360
Queenstown, (see Perry Twp.).
Quinine, effect on acute poliomyelitis in a monkey, ... 508
Quotity, of births, ... 800,826
of marriages, ... 889
Rabies, morbidity, ... 869,872
mortality, ...657,675,715
Radnor Twp., water supply, ... 927
sewerage permits, (cf. Wayne sewerage Co., and Home and Hospital of the Good Shepherd), ... 947
Rahn Twp., water supply, ... 927
Rahter, Dr. J. H., dispensary physician, ... 23
Railway accidents and injuries, causing deaths, ...622,671,689,721,730
Ramey, water supply, ... 928
Ramey Water Co., water works (permit, sources), ... 928,937
Rankin, births, ...763,787,813,839,859
mortality, ... 652
water supply, ... 928
Rayburn Twp., water supply, ... 928
Reade Twp., poliomyelitis complicated by an eruption (Ecthyma impetiginosum?), ... 347
water supply, ... 928
Reading, tuberculosis dispensary, ... 22
births, ...763,787,813,839,859
mortality, ...652,693,699,704,709,714,739
tuberculosis mortality, ... 619
typhoid death rate, ... 606
municipal water works (permits, sources, etc.), 914,928,937,
938,992,997,1001
sewage disposal plant (permits, etc.), 915,947,950,951,1005,1006

Page.
Reading Suburban Water Co., water works (permits, sources), .. 928,936
Rectum, peritonaeum, intestine, cancer of the, as a cause of death, ...659,677,715,724
Rees, Horace P., assistant engineer, ...38,898,900
Reference of cases of pollutions and nuisances to special counsel for final adjustment, ... 1369
Reformatory, (cf. Pennsylvania Industrial Reformatory).
Reichard, Dr. L. M., dispensary physician, ... 24
Reichard, Dr. S., dispensary physician, ... 25
Reifsnyder, Dr. J. C., C. M. I. for Lackawanna Co., ... 7
  abstract of report, ... 157
  dispensary physician, ... 24
  notes on epidemic of smallpox in Dickson City, ... 297
Reilly Twp., water supply, ... 928
Relapsing fever, ...656,714,869
Rendering works, as nuisances. Petitions and complaints, ... 903
Rendham, (cf. Old Forge), Water Co., ... 1086
Renovo, tuberculosis dispensary, ... 23
  sewerage permit, etc., (cf. Drocton Land Co.), ... 947,952
Reportable disease, additions to, ... 43
Repplier, Dr. S. J., dispensary physician, ... 26
  tuberculosis classes, ... 430
Respiratory System, (cf. Larynx, Bronchitis, Lungs, Tuberculosis, etc.), disease of the, as a cause of death, 604,621,663,664,681,682,708 717,726,727,742,743,750
Reynolds, Dr. J. P., special inspector of dispensaries, ... 21
Reynoldsville, sewerage permit, ... 947,954
Rheumatism (and gout)), as a cause of death, ...659,677,702,715,725
Rhode Island (State), typhoid death rate, (1909-1910), ... 606
Rice, Dr. D. S., dispensary physician, ... 23
Rices Landing, smallpox, ... 240
Richland Twp., (Cambria), water supply, ... 928
Richland Twp., (Clarion), water supply, ... 928
Rickets, as a cause of death, ...658,676,715,724
Riddle, William C., assistant engineer, ...28,898,900
Ridgway, tuberculosis dispensary, ... 24
  births, ...764,787,813,839,859
  mortality, ... 652
  municipal water works (permits, sources, operation), 914,928, 936,938,997,1001
  sewerage permit, etc., ...947,950,954
Ridley Twp., water supply, ... 928
Ridley Water Co., water works (permits, sources), ... 928,936
Ridley Park, water supply, ... 928
  sewerage permit, etc., ... 947,952
Riegel, Dr. A. J., C. M. I. for Lebanon Co., ... 7
  abstract of report, ... 154
  dispensary physician, ... 24
Rimer, Dr. J. T., C. M. I. for Clinton Co. 7
  abstract of report, ... 121
  dispensary physician, ... 23
Rimersburg, water works (permit, sources), ... 928,934
Rinehardt, Dr. S. Herman, physician to Mont Alto Sanatorium, . 372
Rinehart, Dr. S. M., C. M. I. for Allegheny Co., ... 7
  abstract of report, ... 86
  dispensary physician, ... 22
Ringtown, Board of Health organized, ... 228
  water supply, ... 928
Ringtown Spring Water Supply Co., water works (permit, sources), ... 928,934
Rittersville, (cf. Homoeopathic State Hospital for Insane, Hanover Twp.), sewerage permits, ... 947
Rivas, Dr. Damaso, bacteriologist, ... 17,437
(with S. D. Dixon), research on the effect of mine waste water upon B. *anthracis* and B. *coli communis*, ... 447,521

Page.
(with S. G. Dixon), research on the presence of B. *anthracis* in the fleshings of hides, ... 447,520
(with H. Fox and J. B. Rucker, Jr.), studies (epidemiological, pathological, etc.), of the epidemic of Anterior poliomyelitis in Eastern Pennsylvania in 1910, ... 447,456
Riverton Consolidated Water Co., water works (permits, sources, plants, etc.), ... 914,928,936,939,991,992
Riverview, smallpox, ... 238

Roberts, Dr. J. K., C. M. I. for Crawford Co., ... 7
  abstract of report, ... 125
  dispensary physician, ... 23

Rochester, tuberculosis dispensary, ... 22
  births, ... 763,787,813,839,859
  mortality, ... 652
  sewerage permit, etc., ... 947,952

Rock Hill, Board of Health organized, ... 226
  water supply, ... 928

Rockledge, water supply, ... 928

Rooms disinfected, report of Health Officers by counties, ... 204
Rose Twp., typhoid fever morbidity by months, ... 1349
  water supply, ... 928

Roselawn Water Co., water works (permits, sources), ... 928,934
Ross Twp., water supply, ... 928
  typhoid fever, ... 1212

Rostraver Twp., water supply, ... 928
Roth, Dr. A. H., dispensary physician, ... 24
Rothrock, Dr. A. M., physician to Mont Alto Sanatorium, ... 372
Roulette Twp., water supply, ... 928
Roulette Water Co., water works (permit, sources), ... 928,937
Royalton, water supply, ... 928

Royer, Dr. B. Franklin, Chief Medical Inspector, ... 66
  Associate Chief Medical Inspector, ... 6
  annual report, ... 65
  representing the Commissioner attended annual meeting of the American Medical Association, ... 57
  and report, ... 269
  at the annual meeting of the Cumberland Valley Medical Association, ... 58
  at the annual meeting of the American Public Health Association, ... 58
  at Rural Progress Conference in Muncy, 58
  at a Symposium on Poliomyelitis at the College of Physicians of Philadelphia, 58
  at the annual meeting of the Greene County Medical Society, ... 59
  delivers an address before the Yough Valley Medical Society at Connellsville, ... 244
  Special reports on epidemics and other conditions requiring medical inspection.
  investigation of diarrhoeal conditions in the city of Chester, ... 233
  Report on diphtheria at the Tressler Orphan Home, ... 237
  Report on smallpox in Fayette County, 238
  (supplementary), ... 240
  report on smallpox in Sugar Creek Twp., 242
  Report on smallpox in Greene County, 243
  Report on investigation of scarlet fever in Wiconisco and Lykens, ... 259
  Report on epidemic poliomyelitis during the year 1910, ... 271-294
  Report on smallpox in Dickson City, ... 295

Page.
Royer, Dr. B. Franklin, Report on the sanitary administration of Pottsville, *re* diphtheria, ... 229
Report on the inspection of Waynesboro on account of an epidemic of diphtheria, ... 301
Report of an inspection of dairies supplying Harrisburg, ... 306
Report on smallpox at Fullerton, ... 244
Report on an inspection in Williamstown concerning measles, ... 245
Report of an inspection at Tower City and vicinity, *re* scarlet fever, etc., .. 247
Report on smallpox in Stowe Twp.,.. 249
Report on an investigation of tuberculosis hospitals in other states, ... 250
Royersford, water supply, ...914,997,1001
Rucker, Dr. James B., Jr., bacteriologist, ... 17,437
(with H. Fox and D. Rivas), studies (epidemiological, pathological, etc.), of the epidemic of anterior poliomyelitis in Eastern Pennsylvania in 1910, ... 447,456
(with H. Fox), bacteriological study of the epidemic of dysentery at Chester, ...233,447,524
Rural births, ...753,767,791,818,843,852,861
Rural morbidity, ...870,874-877,879
Rural mortality, ...617,618,620,649,694,705,711,732,735,740
Rural mortality and influence of adjacent municipalities, ... 618
Rural Progress Conference, department represented in, at Muncy, 58
Rural Valley, water works (permit, sources), ... 928,934
Rutherford Heights Water Supply Co., water works (permits, sources), ... 928,936
Rutherford, report of an inspection on account of typhoid fever, 345
water supply (for P. & R. R. shops, etc.), ... 995,999
Sacramento, typhoid fever, ... 331
Saegerstown, water works, ... 991
St. Benedict, water supply, ...914,997,1001
St. Benedict Water Co., purification plant, ...992,997,1001
St. Clair, Dr. H. P., dispensary physician, ... 23
St. Clair (Allegheny), births, ...764,787,813,839,959
mortality, ... 652
sewerage permits, etc., ...948,950,955
St. Clair (Schuylkill), births, ...764,788,814,840,859
mortality, ... 652
St. Clairsville, (Bedford), no Board of Health, ... 222
St. Marys, births, ...764,787,813,839,859
mortality, ... 652
water supply, ... 929
sewerage permits, etc., ...948,950,951,955
St. Marys Water Co., water works (permit, sources), ... 929,937
St. Vitus's dance, (cf. Chorea).
Salem Twp., water supply, ...929,1235
Salisbury Twp., poliomyelitis, ... 272,277
Salpingitis and other diseases of the female genital organs, as a cause of death, (cf. Genitourinary system), ...666,685,719,728
Saltsburg, sewerage permit, etc., ... 948,955
Salvarsan, injections in monkeys inoculated with the virus of poliomyelitis, ... 476,501
Sample, Dr. G. W., dispensary physician, ... 22
Sanatoria, tuberculosis, (cf. Cresson, Hamburg, Mont Alto, and Division for Control of Tuberculosis): Report on visits to such establishments in other states, ... 250
Sandy Twp., typhoid fever morbidity, ... 1348
Sanitary cleaning when quarantine is raised, ... 74
Sanitary Engineering, see Division of,
Sanitary Inspection, General Sanitation, ...1007,1016
Sanitary Inspection of schools, Forms used, ... 72
Sanitary Inspectors, ...39,900,901
Sankertown, water supply, ... 929

Page.
Sarcoma (lympho-sarcoma) of the dog, studies of, and effect of taurin, 508,510
Saylorsburg Village, water supply, 929
Sayre, births, 764,787,813,839,859
    mortality, 652
    water supply, 914,929,997,1001
    sewerage permits, 948,950,954
Sayre Water Co., purification plant and operation, 997,1001
Scalds, included under Burns, q. v.
Scalp Level, water supply, 929
    sewerage permits, etc., 948,954
Scarlet fever, morbidity, 869,872,877
    mortality, 610,656,674,702,714,723,743,746,750
    in children under two years by days, weeks, months, 624,630 636,642
    in rural districts (with incidental regulations of dairies), (cf. abstracts of reports of C. M. I., tabulations and regulations concerning such cases, 67,201 206,212
    in rural school children, 45
    reports, etc., concerning certain epidemics, Lewisberry, 335
    Lykens, 259
    Tower City, etc., 247
    Wiconisco, 53,259,267
Scattergood, Dr. Joseph, C. M. I. for Chester County, 7
    abstract of report, 118
    dispensary physician, 23
Schaefferstown, (cf. Heidelberg Water Co.).
Schäffle, Dr. Karl, dispensary physician, 26
School children, medical inspection in rural districts, 44,71
Schools, medical inspection of, requested by Advisory Board, 43
School inspectors and inspection, circular of instruction, 68
    report for second class townships in Cumberland, Dauphin and Lancaster counties, 71
Schultz, Dr. W. C., dispensary physician, 24
Schuylkill County, County Medical Inspector, 7
    Township Health Officers, 14,15
    abstract of reports of C. M. I. on communicable diseases, etc., and regulation of dairies because of them, 174,202
    summary of reports of Health Officers, 204
    report of dairy inspections, 208,211,213
    notes on Boards of Health, 228
    tuberculosis dispensaries, 26
    tuberculosis mortality rates for five years, 620
    poliomyelitis, 294
    marriages, 885
    rate (1906-1910), 887
    rural births, 772,798,824,849,864
    rural mortality, 655,696,706,712,742
Schuylkill Twp., water supply, 929
Schuylkill Haven, water supply, 929
    sewerage permit, etc., (cf. Schuylkill County Home and Hospital), 948,952
Schuylkill Haven Gas & Water Co., water works (permits, sources, etc.), 910,912,929,936,939
Schuylkill River, pollution, investigated, 991
Sclerema, as a cause of death, grouped under debility.
Score cards for school inspection, 72
Scotland, (cf. Soldiers' Orphans' Industrial School).
Scott Twp., (Allegheny), (cf. Delmont Land Co. and A. P. Dysart), sewerage permit, etc., 948,950,954
Scott Twp., (Columbia), typhoid fever, 356,1275,1276
Scottdale, births, 764,788,814,840,859
    mortality, 652

Page.
Scottdale: outbreak of typhoid fever, engineering report, ... 1051
sewerage permits, etc., ... 948,955
Scranton, tuberculosis dispensary, ... 24
births, ...764,788,814,839,859
mortality, ...652,693,699,704,709,714,739,750
in children under two by days, weeks, months, ... 642
tuberculosis mortality, ... 619
typhoid death rate, ... 606
water supply, ...914,929,997,1001,1086,1095
Scranton Gas & Water Co., water works (permit, sources, etc.), 929,936
939,992,997,1001
Scurvy, as a cause of death, ...659,677,715,725
Sebillasville, (Md.), State Sanatorium inspected, ... 254
Secretary to Commissioner, (cf. Wilbur Morse), ... 6
Selinsgrove, tuberculosis dispensary, ... 26
sewerage permits, (cf. H. M. McClure), ... 948
Senility, as a cause of death, ...604,669,687,720,729,744,747,751
Sense Organs, (cf. Eye, Ear, Nervous system).
Sepsis, Septichaemia, (cf. Puerperal fever), as a cause of death, 657,667,
675,685,708,715,719,723,728
Sewage, sewers, petitions and complaints, ... 903
Sewage, research on the viability of the bacillus tuberculosis in sewage and water, ... 447,453
Sewerage and disposal plants, general tabulations concerning permits, plants, inspections, etc., ...903,909,915,940,949,991,1004
Sewerage and sewage disposal at Mt. Alto Sanatorium, work done by Engineering Division, ... 965
Sewage disposal plant of State Institution at Polk, ... 980
Sanitary Sewer system, ... 986
Sewers and sewage disposal, estimates for Hamburg Sanatorium, 991
Sewerage and sewage disposal at the State Asylum, (Wernersville), ... 975
Sewickley, sewerage permits, etc., ...948,950,951,954
Sex of patients of Mont Alto Sanatorium, ...365,376 seq.
Sex of patients of the dispensaries, ... 413 seq.
Sex and birth, ... 753
Sex and morbidity, ... 875-880
Sex and mortality, ...605,608-613,653,656,732,733,735,736
Shacks in Sanatoria, at Otisville, (N. Y.), ... 250
at North Reading, (Mass.), ... 251
Shade Twp., water supply, ... 929
Shaler Twp., sewerage permit, etc., ...948,950,952
Shamokin, tuberculosis dispensary, ... 25
births, ...764,788,814,840,859
mortality, ...652,693,704,710,739
tuberculosis mortality, ... 619
typhoid death rate, ... 606
Sharon, tuberculosis dispensary, ... 25
births, ...764,788,814,840,859
mortality, ...652,693,699,704,710,739
tuberculosis mortality, ... 619
typhoid death date, ... 606
water supply, ...914,997,1001
sewerage permit, etc., ... 948,952
Sharon Water Works Co., purification plant and operation, ..992,997,1001
Sharon Hill, water supply, ... 929
sewerage permits, etc., ...948,950,953
Sharpsburg, births, ...765,788,814,840,859
mortality, ... 652
Sharpsville, sewerage permits, etc., ...910,948,950.951,954
Shaugnessy, Moylan E.. assistant engineer, 38,899,900,1081,1223,1241,1288
Shaver Brothers water works (permit, sources), ... 929,937
Shawnee, water supply, ... 929
Shawnee Water Co., ... 1087
Shawnee Water Supply Co.. water works (permit, sources), .. 929,934
Sheakleyville, Board of Health, ... 163,227

Page.
Shearer, Dr. A. L., dispensary physician, 23
Sheatown, (Newport Twp.), water supply, 1112
Sheffer, B. F., et al, status of case against, 1370
Sheffield Twp., water supply, 929
Sheffield Water Co., water works (permit, sources), 929,936
Shenandoah, tuberculosis dispensary, 26
  births, 765,788,814,840,859
  mortality, 653,693,699,704,710,739
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  sewerage permit, etc., 948,952
Shepard, Dr. W. B., dispensary physician, 22
Sheridan, scarlet fever, 247
Sherrer, Dr. H. S., dispensary physician, 25
Shifferstine, Dr. E., dispensary physician, 26
Shinglehouse, water supply, 929
  sewerage permit, etc., 948,954
Shinglehouse Water Co., (unincorporated), water works (permit, sources), 929,934
Shiremanstown, water supply, 929
Shiremanstown Water Co., permits, sources, 929,936
Shirey, Dr. B. W., dispensary physician, 27
Shrewsbury, water works (permit, sources), 929,934
Shrewsbury Twp., typhoid fever, 1312
Sibley Village, water supply, 1096
Sight, cf. Vision.
Simmons, Dr. R. H., C. M. I. for Northumberland Co., 7
  abstract of report, 171
  dispensary physicion, 25
Simpson, E. I., accounting and purchasing agent, 42
  report, 1379
Simpson, Dr. Wm. A., C. M. I. for Indiana Co., 7
  abstract of report, 148
  dispensary physician, 24
Singer, Dr. B. L., dispensary physician, 26
Siverly, sewerage permits, etc., 948,950,955
Skin and annexa, disease of, as a cause of death, 604,667,685,719,729
  cancer of, as a cause of death, 659,677,715,724
Skin affections in rural school children, 45
Skin eruption in poliomyelitis, 286,347
Slaughter house, as nuisances, petitions and complaints, 903
Slippery Rock, water works (permit, sources), 929;934
  sewerage permits, etc., 948,952
Smallpox, morbidity, 47,55,584
  statistical, 869,872
  in the rural districts and with reference to dairy regulation, (cf. abstracts of C. M. I.), summaries, etc., 67,201
  vaccine distribution, 585
  mortality, 656,674,702,714,743
  special reports concerning outbreaks, Dickson City, 294
  Fayette County, 238,240
  Fullerton, 244
  Greene County, 243
  Sugar Creek Twp., 242
  Stowe Twp., 249
Smethport, sewerage permits, etc., 948,954
Smink, Dr. A. H., dispensary physician, 25
Smith, Dr. Allen J., Director of Pathology in Division of Laboratories and Experimental Station, 17
  report, 435
Smith, Dr. W. C., dispensary physician, 27
Smithfield Twp., (Monroe), water supply, 929
Smithfield Twp., (Huntingdon), (cf. Penna. Industrial Reformatory), sewerage permits, 948
Smyser, Dr. H. D., dispensary physician, 27

Page.

- Snodgrass, Dr. Bruce, C. M. I. for Beaver Co., ... 66
  - abstract of report, ... 94
  - dispensary physician, ... 22
- Snow, F. Herbert, Chief Engineer, ...38,897,1080,1223
  - report, ... 895
- Snyder County, County Medical Inspector, ... 7
  - Township Health Officers, ... 15
  - abstract of reports of County Medical Inspector on communicable diseases and regulation of dairies because of them, ... 182,202
  - summary of reports of Health Officers, ... 204
  - report of dairy inspections, ...209,211,213
  - tuberculosis dispensary, ... 26
  - tuberculosis mortality rates for five years, ... 620
  - poliomyelitis, ... 294
  - marriages, ... 885
  - rate (1906-1910), ... 887
  - rural births, ...772,798,824,850,864
  - rural mortality, ...655,696,706,712,742
- Social service work of the dispensaries, ... 403,429
- Sodium carbonate, use in the purification plants, ... 999
- Soldiers' Orphans' Industrial School, Scotland, Franklin Co., sewage disposal plant, ...1005,1006
- Somerset County, County Medical Inspector, ... 7
  - Township Health Officers, ... 15
  - abstract of report of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, ... 184,202
  - summary of reports of Health Officers, ... 204
  - report of dairy inspections, ...208,211,213
  - notes on Boards of Health, ... 228
  - tuberculosis dispensary, ... 26
  - tuberculosis mortality rates for five years, .. 620
  - poliomyelitis, ... 294
  - marriages, ... 886
  - rate (1906-1910), ... 887
  - rural births, ...772,798,824,850,864
  - rural mortality, ...655,696,706,712,742
- Somerset County Poor Directors (home in Somerset Twp.), water works (permit, sources), ... 929,934
- Somerset, sewerage permits, etc., ...948,950,952,1331
- Somerset Twp., (Somerset), water supply, ... 929
- Somerset Twp., (Washington), typhoid fever, ... 1079
- Sons of America, (cf. P. O. S. of A.).
- Sources of Supply, for water works systems having permits, .. 934
  - for the purification plants, ... 995
- South Allentown, Board of Health organized, ... 226
- South Annville Twp., water supply, ... 929
- South Annville Water Supply Co., water source, permit, etc.,910,912,929,936
- South Bethlehem, (Armstrong), water supply, ... 929
  - sewerage permits, etc., ... 948,954
- South Bethlehem, (Northampton), sewerage permits, etc., ... 948,954
  - tuberculosis dispensary, ... 25
  - births, ...765,789,815,840,859
  - mortality, ...653,693,699,704,710,739
  - tuberculosis mortality, ... 616,619
  - typhoid death rate, ... 606
  - poliomyelitis, ...272,277,284
  - water supply, ...914,997,1001
- South Bradford Water Co., water works (permit, sources), ... 929,934
- South Brownsville, sewerage permits, etc., ... 948,954
- South Canonsburg, sewerage permits, etc., ...948,950,951,953
- South Easton Water Co., water works (permit, sources), ... 929,934
- South Fork, outbreak of typhoid fever, report of the division of engineering, ... 1034
  - sewerage permits, etc., ... 948,955

Page.
South Fork Water Co., history and supply, ... 1039
South Heights, (Beaver), Board of Health, ... 222
South Lebanon Twp., water supply, ... 929
South Londonderry Twp., (cf. Mt. Gretna Park), sewerage permits, 948
South Middleton Twp., water supply, ... 929
South Phillipsburg, (Centre), Board of Health reorganized, ... 223
South Pittsburgh, water supply, ...914,997,1001
South Pittsburgh Water Co., purification plant and operation, .. 997,1001
South Renovo, water works (permit, sources), ... 929,936
South Sharon, births, ...765,789,815,841,860
mortality, ...653,693,699,704,710,739
typhoid death rate, ... 606
water supply, ...914,997,1001
sewerage permits, etc., ... 948,952
South Union Twp., smallpox, ... 238
South Wayne (plant), Wayne, sewage disposal plant, ... 916,1006
South Whitehall Twp., (cf. Lehigh Co. Commissioners), sewerage permits, ... 948
Southwest Water Co., ... 1332
Spangler, water supply, ... 929
Special inspectors, cf. inspectors.
Speers, no Board of Health, ... 229
Spicer, Dr. C. E., dispensary physician, ... 23
Spinal cord, disease of, (other than locomotor ataxia, cerebrospinal meningitis, or fever), as a cause of death, (cf. Poliomyelitis), ... 661,679 716,725
Spine, disease of, (cf. Pott's disease).
Spleen, disease of the, as a cause of death, (cf. Lymphatic system), 665,683 718,727
Spring Brook Water Co., and the Spring Brook Supply, ...1086,1089
and the typhoid epidemic, ...1115,1137
Spring Brook Water Supply Co., (cf. Wilkes-Barre), plants and operations, ...993,998,1001,1086,1088,1089,1090
Spring City, (cf. E. Penna. State Institution for Feeble Minded and Epileptic, E. Vincent Twp.), sewerage permits, 948
water supply, ...914,929,997,1001
Springdale, water supply and permit, ... 930
sewerage permit, (cf. Penna. Glue Co.), ... 948
Springdale Water Co., water works (permit, sources), ... 930,934
Spring water (commercial), examinations in connection with the epidemic of the Wyoming Valley, (cf. Vulcan Spring), ... 1194
Springetsbury Twp., water supply, ... 930
Springfield Twp., (Delaware), (cf. Dermady Sanatorium), sewerage permit, ... 948
Springfield Twp., (Fayette), typhoid fever morbidity by months, . 1342
Springfield Consolidated Water Co., water works (permits, plants, sources, etc.), ...914,930,936,939,992,997,1001
Springfield Water Co., water works (permit, sources, etc.), ... 914,930 936,939
Spring Garden Twp., water supply, ... 930
Spring Grove, water supply, ...914,997,1001
"Spunk," 371
Sputum examinations at Mont Alto Sanatorium, ... 368
Sputum, examinations in the laboratories, ... 438,440
technique, ... 440
Sputum cups made at Mont Alto, ... 369
Stable for cows, summary of inspection, ... 205
details by counties, ... 209
Staining of tubercle bacilli, also when degreases, ... 514
Starvation, as a cause of death, ...671,689,721
State Asylum for the chronic insane (Wernersville), work done by the engineering division, (sewerage and sewage disposal), ... 975
sewage disposal plant (permits, etc.), (cf. Heidelberg Twp.), ...915,948,951,1005

Page.

- State College, (cf. Pennsylvania State College and John Hamilton), water supply, 930
  - sewerage permits, 948
- State College Water Co., water works (permit, sources), 930,936
- State Hospital for the Insane, (Danville), water works (permit, etc.), 913,930,935,938
  - sewage disposal plant (permits, etc.), (cf. Danville), 915,948,951,1005
- State Hospital for the Insane of the Southeastern District, Norristown, sewage disposal plant (permits, etc.), 915,948,951,1006
- State Hospital for the Insane at Warren, sewerage permits, etc., 948,952
- State Institution for Feeble Minded of W. Penna., (Polk),
  - work done by the engineering division, 980
  - sewage disposal plant (permits, etc.), 915,948,951,1005
- "State Medical Institute," prosecuted for the fraudulent practice of medicine, 218
- State Registrar, (cf. W. R. Batt).
- Statistics, division of, (Bureau of Vital Statistics, etc.), 41,601
- Statistics, Vital, report on, 601
  - mortality, 601
  - births, 752
  - morbidity, 867
  - marriage, 881
- Statistician of the dispensaries, work of, 401
- Statler, Dr. E. V., dispensary physician, 24
- Steelton, births, 765,789,814,841,859
  - mortality, 653,694,699,704,710,739
  - tuberculosis mortality, 616,619
  - municipal water works (permits, sources, plant, etc.), 914,930 936,939,992,997,1001
- Stenographers, 6,17,19,21,28,39,41,42,901,1378
- Stewart, Dr. S. C., C. M. I. for Clearfield Co., 7
  - abstract of report, 120
  - dispensary physician, 23
- Stewartstown, no Board of Health, 230
- Stites, Dr. Thomas H. A., Medical Inspector of dispensaries, 20
  - annual report, 398
  - representative of the department at the annual session of the National Association for the study and prevention of tuberculosis, 57
  - report, 431
- Stock, Dr. Geo. A., C. M. I. for Montour Co., 7
  - abstract of report, 168
  - dispensary physician, 25
- Stolzenbach, Dr. F., dispensary physician, 22
- Stomach, diseases of (except cancer), as a cause of death, 664,682 718,727,743,747,750
  - in children under two years, by days, weeks, months, 624,630, 636,642
- Stomach, liver, cancer of, as a cause of death, 659,677,715,724
- Stomach fluids, examination in the laboratory (technique, especially in carcinoma), 441
- Stone, (cf. Calculi).
- Stone, Raymond D., water works (permit, sources), 930,934
- Stoneham Tannery, (cf. Elk Tanning Co.).
- Stonycreek Twp., water supply, 930
- Stowe Twp., smallpox, 249
  - water supply, 930
- Stoyestown, Board of Health, inactive, 228
  - water supply, 930
  - sewerage permits, etc., 948,955
- Stoyestown Water Co., water works (permit, sources), 930,934
- Strangulation, (cf. Hanging).

Page.
Straw Itch in Bedford Co., 95
Strayer, Dr. J. P., C. M. I. for Venango Co., 7
  abstract of report, 190
  dispensary physician, 26
Stream inspection, (cf. watershed inspection).
Stream pollutions, petitions and complaints, 903
  prosecution (*re* Codorus Creek), 1296
  cases referred to special counsel, 1369
Street car accident or injury, as a cause of death, 671,689,721,730
Strode, George K., 20
Stroudsburg, tuberculosis dispensary, 25
  water supply, 930
  sewerage permits, etc., 949,955
Stroudsburg Water Supply Co., water works (permit, sources), 912,930,937
Stuart, Edwin S., Governor of Pennsylvania, extract from his last message, 61
Subcutaneous tissue, (cf. skin).
Sub-divisions, (cf. Divisions).
Suburban Drainage Co., (cf. Harrisburg), sewerage permit, etc., 911,949,955
Suburban Water Co. of Allegheny Co., water works (permit, sources, etc.), 910,912,930,936,939
Sudden death, cf. Puerperal State, Suicide.
Sugar Creek Twp., smallpox, 242
  water supply, 931
Sugar Grove, Board of Health organized, 229
Sugar Notch, water supply, 1088,1114
  typhoid fever, 1115,1212
  notified to enforce sanitary regulations, 1220
Suicide, statistics of, 622,669,670,687,688,708,720,721,729,730,744,747,751
Sullivan County, County Medical Inspector, 7
  Township Health Officers, 15
  abstract of reports of C. M. I., investigation of communicable disease and regulation of dairies because of them, 185,202
  summary of reports of Health Officers, 204
  report of dairy inspections, 209,211,213
  notes on Boards of Health, 228
  tuberculosis dispensary, 26
  tuberculosis mortality rates for five years, 620
  marriages, 886
  rate (1906-1910), 887
  rural births, 772,798,824,850,865
  rural mortality, 655,696,706,712,742
Summit Hill, sewerage permits, etc., 949,950,954
Sunbury, tuberculosis dispensary, 25
  births, 765,789,815,841,860
  mortality, 653,694,699,704,710,739
  tuberculosis mortality, 616,619
  water supply, 914,931,997,1001
  sewerage permits, etc. (cf. East End Sewer Co., Susquehanna Sewer Co., Third Ward Sewer Co.), 949,952
Sunbury Water Co., water works, (permits, sources, plants, etc.), 912,931 936,939,993,997,1001
Supplies, division of, 42,1377
Suprarenal disease (cf. Addison's disease).
Suspension of Dead T. B. (cf. Tubercle Bacilli Products).
Susquehanna County, County Medical Inspector, 7
  Township Health Officers, 15
  abstract of report of County Medical Inspector; investigation of communicable diseases and regulation of dairies because of them, 186,203
  summary of reports of Health Officers, 204
  report of dairy inspections, 209,211,213

Page.

- Susquehanna County, notes on Boards of Health, 229
  - tuberculosis dispensaries, 26
  - tuberculosis mortality rates for five years, 620
  - marriages, 886
  - rates (1906-1910), 887
  - rural births, 773,798,824,850,865
  - rural mortality, 655,696,706,712,742
- Susquehanna, tuberculosis dispensary, 26
  - sewage disposal plant, 910
- Susquehanna Depot, sewerage permits, etc., 949,950,952,954
- Susquehanna Twp., water supply, 931
  - (cf. Penna. State Lunatic Hospital and Suburban Drainage Co.), sewerage permits, 949
- Susquehanna Twp. Water Co., water works, (permit, sources), 931,936
- Susquehanna Sewer Co., (cf. Sunbury), sewerage permits, 955
- Susquehanna River Water, quality of, 1093
- Susquehanna River, examination of its relation to the Wyoming Valley epidemic, (boating, bathing, washing), 1190
- Swagertown, water supply, 1331
- Swamp lands, etc., as nuisances, petitions and complaints, 903
- Swarthmore, sewerage permits, etc., 949,950,952,955
- Swatara Twp., water supply, 931,996,1000
- Sweeney, Dr. M. J., dispensary physician, 25
- Sweet Valley (Ross Twp.), typhoid fever, 1213
- Swissvale, births, 765,789,815,841,860
  - mortality, 653
  - water supply, 931
- Swoyersville, births, 765,789,815,841,860
  - mortality, 653
  - water supply, 1087,1109
  - typhoid fever, 1115,1212
  - notified to enforce the health regulations, 1220
- Symbols, used in records of the condition of the lungs at Mont Alto Sanatorium, 373
- Syphilis, as a cause of death, 659,677,715,724
  - in children under two, by days, weeks, months, 624,630,636,642

- "Talks" of the Commissioner of Health, 62
- Tamaqua, tuberculosis dispensary, 26
  - births, 765,789,815,841,860
  - mortality, 653
  - water works, (permits, sources), 931,936
- Tannery waste disposal, 991
- Tannery wastes, experiments with, 1006
  - research concerning their germicidal action on B. *anthacis* and B. *coli communis*, 521
- Tarentum, tuberculosis dispensary, 22
  - births, 765,789,815,841,860
  - mortality, 653
  - water supply, 914,931,939,998,1001
  - sewerage permits, etc., 949,950,952,954
- Tarentum Water Co., water works, (permit, sources), 931,936
- Taurin, research concerning its effect on tumors of dog and mouse, 447(2),508
- Taylor, new Board of Health, 226
  - action concerning neglect of regulations, 1215
  - births, 765,789,815,841,860
  - mortality, 653
  - water supply, 1086,1091,1096
  - sewerage permits, etc., 949,955
- Taylor Twp., water supply, 931
  - sewerage permits (cf. West Pittsburgh Realty Co.), 949
- Taylorville Water Co., 1086

Page.
Technique, special laboratory notes, ...438,440,454,478
Tener, John K., Governor of Pennsylvania, letter of transmittal to, 3
  extracts from his addresses, ... 5
Tetanus, (cf. tetanus antitoxin), morbidity, ... 869,872
  mortality, ...657,675,715,724
  in children under two, by days, weeks, months, 624,630,636,642
Tetanus antitoxin, distribution and use, ...55,529,593
Texas Twp., engineering report on the outbreak of typhoid fever (suburb of Honesdale), ... 1240
  typhoid fever morbidity, (1905-1910), ... 1244
  water supply, ...1241,1246
Third Ward Sewer Co., (cf. Sunbury), sewerage permits, etc., ... 949,955
Thomason, Dr. W. P., dispensary physician, ... 25
Thomb, Dr. F. H., dispensary physician, ... 23
Thompson, Dr. H. H., physician to Mont Alto Sanatorium,...... 18
Thompsontown, no Board of Health, ... 226
  water supply, ... 931
Throat, (cf. Larynx, Nasopharynx, Oesophagus, Pharynx).
Thrombosis, (cf. Embolism).
Throop, births, ...765,789,815,841,860
  mortality, ... 653
  water supply, ... 931
Thyreoid body, disease of, as a cause of death, ...663,681,717,726
Tillman, Dr. W. G., dispensary physician, ... 25
Tinicum Twp., water supply, ... 931
Tioga County, County Medical Inspector, ... 7
  Township Health Officers, ... 15
  abstract of reports of County Medical Inspector, investigation of communicable diseases and regulation of dairies because of them, ... 187,203
  summary of reports of Health Officers, ... 204
  report of dairy inspections, ...209,211,213
  notes on Boards of Health, ... 229
  tuberculosis dispensary, ... 26
  tuberculosis mortality for five years, ... 620
  poliomyelitis, ... 282,294
  marriages, ... 886
  rate (1906-1910), ... 887
  rural births, ...773,798,824,850,865
  rural mortality, ...655,696,706,712,742
Tioga, tuberculosis dispensary, ... 26
Tionesta, tuberculosis dispensary, ... 24
  Board of Health, ... 225
Titusville, tuberculosis dispensary, ... 23
  births, ...766,790,816,841,860
  mortality, ... 653
  malaria (Lab. report), ... 438
  report of the Engineering Division concerning an outbreak of typhoid fever, ... 1032
  sewerage permit, etc., ... 949,955
Toby Creek, as a water supply, ... 1107
  and the Wyoming Valley epidemic, ...1115,1128
  Water Co., ... 1087
Tonsillectomy and effect of, on patients of two dispensaries, ... 407,409
Torrey, Dr. R. G., dispensary physician, ... 26
Towanda, tuberculosis dispensary, ... 22
  water supply, ... 931
  sewerage permit, etc., ... 949,954
Towanda Water Co., water works, (permit, supply), ... 931,937
Tower City, report of an inspection in the matter of scarlet fever, etc., ... 247

Page.
Township Health Officers, (cf. Errata of p. 14; see also Health Officers), ... 8
Townville, no Board of Health, ... 224
Trachoma, morbidity, ... 869,872
Trafford, water supply, ... 931
Trainer, Dr. R. F., dispensary physician, ... 25
Traumatism, as a cause of death ,(see also External causes), .. 670,671, 689,721,730
Traveling Tuberculosis Exhibit, (cf. tuberculosis).
Tredyffrin Twp., water supply, ... 931
Tree blight during the epidemic of poliomyelitis, ... 460
Tremont, water supply, ... 931
Tremont Water and Gas Co., water works, (permits, sources), 931,937
Tressler Orphan Home, Loysville, Perry Co., report of an outbreak of diphtheria, ... 237
  sewage disposal plant, ...916,991,1005,1006
Trevorton Water Supply Co., water works, (permit, sources),.. 931,934
Trevorton Sewerage Co., (cf. Zerbe Twp.); sewerage permit, etc., 949,952
Trevose Manor Spring Water Co., water works, (permit, sources), 931,934
Trichiniasis, morbidity, ... 869,872
Triplets, urban and rural and by maternal nativity, ... 852
Trolley cars (cf. street car accidents).
Trotter Water Co., ... 1332
Trout Run Water Co., water works, (permit, sources), ... 931,937
Tubercle Bacilli Products, (cf. Bac. *tuberculosis*, and Wax), distribution and use, preparation and dosage, ...55,529,585
  experiments to determine the change produced by age, ... 447,519
  experiments to determine their influence in producing tolerance, ... 447,448
  experiments to determine their effect upon epithelial organs, ... 447,450
  special report on their use in the Sanatorium at Mont Alto, ... 374
  in dispensary No. 33, ... 433
Tubercle bacillus (cf. Bacillus tuberculosis).
Tuberculin (cf. Tubercle bacilli products).
Tuberculosis (cf. Bacillus *tuberculosis*, tubercle bacilli, dispensaries, sanatorium, etc.); morbidity, ...869,872,879,880
  mortality, ...612,658,676,702,715,724,747,750
  (children under two years by days, weeks, months), 624,630, 636,642
  mortality (1906-1910) (general discussion; rates in Pennsylvania and elsewhere; percentage of various forms, etc.), ... 612-620
  the anti-tuberculosis campaign, ... 48
  British Royal Commission on, abstract of report, 59
  circular (revised) on the management of pulmonary T., ... 80
  classes, ... 430
  classification of cases used at Mont Alto, ... 372
  division for the control of, ... 18
  report of the sub-division of Sanatoria, (cf. Sanatorium), ... 365
  report of the sub-division of dispensaries, (cf. dispensaries), ... 398
  exhibit, traveling, ... 21,52
  report of the Demonstrator and Lecturer, ... 410
  hospitals inspected: Otisville, (N. Y.) 250
    North Reading State Sanatorium, (Mass.), ... 251,257
    Matapan, (Mass.), ... 252
    Westfield, (Mass.), ... 252,255
    Sebillasville, (Md.), ... 254

Page.

Tuberculosis hospitals inspected: National Association for the Study and Prevention of, Dr. Stites represents the Commissioner at the annual meeting, 57
  report, 482
  urine examinations in the laboratories, 441

Tucker, Dr. J. D., dispensary physician, 24

Tumors of dog and mouse, laboratory research concerning the effects of Taurin on, 447,508

Tumor, (see also Cancer, Liver, Uterus), mortality, 659,677,715,725

Tunkhannock, tuberculosis dispensary, 27

Tunnel Hill, status of Board of Health, 334
  typhoid fever (?), 334

Turbett Twp., water supply, 931

Turbotville, Board of Health reorganized, 228

Turnbull, Dr. W. G., dispensary physician, 26

Turner, Dr. Annie, dispensary physician, 26
  tuberculosis classes, 430

Turtle Creek, water supply, 931

Twilight, no Board of Health, 229

Twins, urban and rural, and by nativity of mother, 852

Typhlitis, (cf. Appendicitis).

Typhoid fever, morbidity statistics, 869,873,874
  mortality statistics, 606,607 608,656,674,702,714,723,743,746,750
  in rural districts and incidental regulation of dairies, (cf. abstracts of reports of C. M. I.), 67,201,206,212
  special reports of the division of Medical Inspection on epidemics or inspections necessitated by such, Espy, 354
  Harrisburg, 306
  Irvona, 316
  Lime Ridge, 354
  Mahaffey, 314
  Rutherford Station, 345
  Wayne, 351
  Williams Township, 330
  Woodland, 321
  Special reports of the Division of Sanitary Engineering on epidemics and the conditions relating thereto: Avella, 1285
  (Berwick, 1223)
  Brookville, 1023
  Byrensville, 1313
  Cokeburg, 1077
  Connellsville, 1329
  Coraopolis, 1316
  Dillsburg, 1071
  Falls Creek, 1342
  Glen Rock, 1287
  Greene County, (Cumberland and Jefferson Twps.) 1351
  Lime Ridge, 1268
  Mt. Joy, 1278
  Nescopeck and Berwick, 1223
  Quarryville, 1354
  Penna. Industr. Reformatory, 1249
  Scottdale, 1052
  South Fork, 1034
  Texas Twp. (Honesdale suburb), 1241
  Titusville, 1032
  Woodland, 1321
  Wyoming Valley (Wilkes-Barre, etc.), 1080

Page.
Typhus fever, 656,869
Tyrone, tuberculosis dispensary, 22
  water supply, 931
  sewerage permits, etc., 949,952
  births, 766,790,816,842,860
  mortality, 653

Ulcer of the stomach, as a cause of death, 664,682,718,727
Uncinariasis (cf. Ankylostomiasis), made reportable, 43
  morbidity, 869
Underwood, Dr. S. L., dispensary physician, 25
Union County, County Medical Inspector, 7
  Township Health Officers, 15
  abstract of reports of C. M. I.; investigation of communicable diseases and regulation of dairies because of them, 189,203
  summary of reports of Health Officers, 204
  report of dairy inspections, 209,211,213
  notes on Boards of Health, 229
  tuberculosis dispensary, 26
  tuberculosis mortality rates for five years, 620
  poliomyelitis, 294
  marriages, 886
  rate, (1906-1910), 887
  rural births, 773,798,825,850,865
  rural mortality, 655,696,706,712,742
Union City, sewerage permits, etc., 949,955
Uniontown (Dauphin), Board of Health organized, 225
Uniontown (Fayette), (tuberculosis dispensary, 24
  births, 766,790,816,842,860
  mortality, 653,694,699,704,710,740
  typhoid death rate, 606
  smallpox, 238,243
  water supply, 931,936
  sewerage application, permits, (cf. Markle and Frank), 949,953
Uniontown Water Co., water works, (permit, sources), 931,936
Unionville, Board of Health organized, 223
Unity Water Co., water works (permit, sources, etc.), 912,931,936
University Water Co., water works, (permit, sources), 931,936
Unsanitary premises, etc., petitions and complaints, 903
Upland, water supply, 931
  sewerage permits, etc., 949,950,952
Upper Darby, water supply, 931
Upper Dublin Twp., water supply, 931
Upper Mauch Chunk Water Co., water works, (permit, souruces), 931,937
Upper Merion Twp., water supply, 931
Upper Mt. Bethel Twp., water supply, 931
Urban births, 753,774,800,826,852
  morbidity, 870,874-877,879
  mortality, 615,618,619,649,732,735,738
  influence on rural mortality from tuberculosis, 618
Urinary passages, disease of, as a cause of death, (cf. Calculi, Kidney), 666,684,718,719,727,728
Urine, bacterial examinations in the Laboratory, 438
  examinations at Mont Alto Sanatorium, 368
Uterus, cancer of, as a cause of death, 659,677,715,724
  other mortal disease of, 666,684,719,728

Vaccine and vaccine supplies, distribution, 55,529
Valley Water Co., 1086
Valley Camp Association, (cf. L. Burrell Twp.), sewage disposal plant, 910

Page.

Valley View, typhoid fever, ... 331
Vandergrift, investigation of acid wastes of manufacturing plants, 1007
    water supply, (cf. Vandergrift W. Co.)
Vandergrift Water Co., purification plant, ... 914,998,1001
Varicella, (cf. Chicken pox).
Varices, (cf. Veins).
Variola, (cf. Smallpox).
Vehicular traumatism as a cause of accidental death, ... 671,689,721,730
Veins, disease of (Varix, Haemorrhoid, Phlebitis), as a cause of death, (cf. phlegmasia), ... 662,681,717,726
Venango County, County Medical Inspector, ... 7
    Township Health Officers, ... 16
    abstract of reports of C. M. I.; investigation of communicable disease and regulation of dairies because of them, ... 190,203
    summary of reports of Health Officers, ... 204
    report of dairy inspections, ... 209,211,213
    notes on Boards of Health, ... 229
    tuberculosis dispensary, ... 26
    tuberculosis mortality, ... 617
    rates for five years, ... 620
    poliomyelitis, ... 294
    marriages, ... 886
    rate, (1906-1910), ... 888
    rural births, ... 773,799,825,850,865
    rural mortality, ... 655,696,706,712,742
Venango, status of Board of Health, ... 224
Venango Oil and Land Co., water works, (permit, sources), ... 931,934
Venango Water Co., water works, (permits, sources, etc.), ... 931,937,939
Venereal disease as a cause of death, (cf. Gonococcus infection, Syphilis).
Vermont (State), typhoid death rate, (1909-1910), ... 606
Verona, water supply, ... 932
    sewerage permits, etc., ... 949,955
Versailles, sewerage permits, etc., ... 949,952
Vesta Coal Co., (cf. E. Bethlehem Twp.), sewerage permits, etc., 949,950,952
Villa Maria Convent, sewage disposal plant, ... 910
Villanova College, sewage disposal plant, ... 916,1005
Violent deaths, except suicide, (cf. External causes, Homicide), 622,672, 690,708,722,731,744,747,751
Vision, in rural school children, ... 45,69,72
Visiting nurses, (cf. nurses), of dispensaries, ... 20
Vital statistics, bureau of, ... 41,54,601
Vital statistics, interpretation as regards tuberculosis of the lungs, ... 614
Volant, no Board of Health, ... 226
Vomitus, in poliomyelitis, ... 464
Vulcan Spring, (near Wilkes-Barre), as a cause of typhoid fever, 1192

Wadham, Dr. R. L., dispensary physician, ... 25
Wagenseller, Dr. F. J., C. M. I. for Snyder County, ... 7
    abstract of report, ... 182
    dispensary physician, ... 26
Wagner, Dr. Jesse L., dispensary physician, ... 22
Wagner, Dr. Joseph, dispensary physician, ... 24
Walde, Dr. J. M., dispensary physician, ... 23
Wall, water supply, ... 932
    sewerage permits, etc., ... 949,950,952
Wallaceton, no Board of Health, ... 224
    typhoid fever morbidity (1910), by months, ... 1327
Walley, Dr. S. P., dispensary physician, ... 24
Wallingford, water supply, ... 996,1000
Walnutport, Board of Health, ... 227

Page.

- Wanamie, (Hanover Twp.), water supply, 1114
- Warren, Dr. B. H., member of Advisory Board, 4
- Warren County, County Medical Inspector, 7
  - Township Health Officers, 16
  - abstract of reports of C. M. I., investigation of communicable disease and regulation of dairies because of them, 191,203
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 209,211,213
  - notes on Board of Health, 229
  - tuberculosis dispensary, 26
  - tuberculosis mortality, 617
  - rate for five years, 620
  - poliomyelitis, 294
  - marriages, 886
  - rate (1906-1910), 888
  - rural births, 773,799,825,851,865
  - rural mortality, 655,696,707,713,742
- Warren, tuberculosis dispensary, 26
  - births, 766,790,816,842,860
  - mortality, 653,694,699,704,710,740
  - tuberculosis mortality, 616,619
  - typhoid death rate, 606
  - water supply, 914,932,998,1001
  - sewerage permits, etc., (cf. State Hospital for the Insane), 949,950,955
- Warren Water Co., water works (permits, sources, plant, etc.), 932,936 939,993,997,1001
  - sewage disposal plant at filter plant, 916,1005
- Warrington Twp., special report concerning typhoid fever, 338
  - typhoid fever, 1071
- Warrior Run, water supply, 1088,1114
  - typhoid fever, 1115,1212
  - notified to enforce sanitary regulations, 1220
- Washington County, County Medical Inspector, 7
  - Township Health Officers, 16
  - abstract of reports of C. M. I., investigation of diseases and regulation of dairies because of them, 191,203
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 209,211,213
  - notes on Boards of Health, 229
  - tuberculosis dispensaries, 27
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 886
  - rate (1906-1910), 888
  - rural births, 773,799,825,851,865
  - rural mortality, 655,696,707,713,742
  - atlas begun, 907
- Washington, tuberculosis dispensary, 27
  - births, 766,790,816,842,860
  - mortality, 653,694,699,704,710,740
  - typhoid death rate, 606
  - water supply, (cf. Citizens W. Co.), 914,998,1001
  - sewage disposal plant (permits, etc.), 915,949, 950,951,1005,1006
- Washington Twp., (Jefferson), typhoid fever morbidity, 1348
- Washington Twp., (Washington), water supply, 932
- Washington Twp., (York), typhoid fever, 1071
- Washingtonville, status of Board of Health, 227
- Wasley, Dr. H. M., dispensary physician, 26
- Wassermann reaction in monkeys inoculated with poliomyelitis, 477

Page.

- Water, tap and distilled, laboratory study of the viability of B. *tuberculosis* therein, 447,453
  - examinations made in the laboratories, 438,441
  - waste of mines and tanneries, research on their effect on B. *anthracis* and B. *coli communis*, 447,521
  - bottled and spring, examined, in relation to the epidemic in the Wyoming Valley, 1192,1194
  - spring, vended, relation to typhoid fever at eNscopeck, 1231
  - sampling for examination, 1006
  - supply for cattle, summary of inspections, 205
  - details by counties, 207
  - filters, inspectors of, 41
  - purification, chemical germicides disapproved, 57
  - in relation to typhoid fever, compare the reports of epidemics,
  - supplies, general reports on permits, plants and operations, 909,913,916,938,991,995,999
  - supplies (pollutions and impurities), petitions and complaints, 903
- Water Works, etc., for the Sanatoria, work done by the Division of San. ngineering.
  - Mont Alto, 956
  - Cresson, 970
  - estimate for Hamburg, 990
- Waterford, status of Board of Health, 225
  - water supply, 932
- Waterford Water Co., water works (permits, sources), 932,934
- Watershed inspection and improvement, 1007
- Watson, Dr. R. B., C. M. I. for Clinton County, 7
  - abstract of report, 123
  - dispensary physician, 23
- Watsontown, sewerage permits, etc., 949,950,955
- Wattsburg, status of Board of Health, 225
- Wax of the tubercle bacillus, tentative experiments therewith regarding the production of tolerance, 450
- Wayne County, County Medical Inspector, 7
  - Township Health Officers, 16
  - abstract of report of C. M. I., investigation of communicable diseases and regulation of dairies because of them, 195,203
  - summary of reports of Health Officers, 204
  - report of dairy inspections, 209,211,213
  - notes on Boards of Health, 230
  - tuberculosis dispensary, 27
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, 294
  - marriages, 886
  - rate (1906-1910), 888
  - rural births, 773,799,825,851,865
  - rural mortality, 655,696,707,713,742
- Wayne, special medical report on an outbreak of typhoid fever, 351
- Wayne sewerage Co., (cf. Radnor Twp.), sewage disposal plant (permits, etc.), 916,949,950,951,1005,1006
- Waynesboro, tuberculosis dispensary, 24
  - births, 766,790,816,842,860
  - mortality, 653
  - special report on an epidemic of diphtheria, 301
- Waynesburg, tuberculosis dispensary, 24
  - water supply, 914,998,1001
- Waynesburg Water Co., purification plant and operation, 998,1001
- Weatherly, (Carbon), no Board of Health, 223
  - water supply, 932
- Weatherly Water Co., water works (permit, sources), 932,936
- Weaver, Dr. L. S., dispensary physician, 27
- Weber, Dr. Charles, dispensary physician, 26

Page.
Webbert, Charles W., general inspector, 5,6
  report, 215
Weddle, Dr. J. N., dispensary physician, 27
Weight, changes of, in patients of Mont Alto Sanatorium, 366,376 seq.
  in patients of the dispensaries, 399
  in certain dispensary patients after operations on the tonsils, etc., 408,409
Weissport, status of Board of Health, 223
Weldon Water Co., water works (permit, sources), 932,937
Wellsboro, tuberculosis dispensary, 26
  water supply, 932
  sewerage permits, etc., 949,953
Wellsboro Water Co., water works (permits, sources), 932,937
Wellsville, Board of Health, 217,230
Wernersville, (cf. State Asylum for Chronic Insane), sewerage permits, 949
West Apollo, water supply, 995,999
West Berwick, births, 766,790,816,842,860
  mortality, 653
  water supply, 932,1235
  typhoid fever morbidity (1906-1910), (cf. Berwick), 1226
West Berwick Water Supply Co., water works (permit, sources), 932,937
West Bethlehem Twp., typhoid fever, 1079
  water supply, 932
West Brownsville, sewerage permits, etc., 911,949,952
West Chester, tuberculosis dispensary, 23
  births, 766,791,817,842,860
  mortality, 653,694,699,704,740
  tuberculosis mortality, 616,619
  typhoid death rate, 606
  water works (permit, sources, etc.), 912,932,936
  sewage permits, etc., 910,949,951,952
West End, sewerage permits, etc., 949,951,955
West Fairview, tuberculosis dispensary, 23
West Hazleton, water supply, 932
  sewerage permits, etc., 949,951,955
West Houtzdale Water Co., water works (permit, sources), 932,937
West Lebanon Twp., status of Board of Health, 226
West Liberty Improvement Co., (cf. Baldwin Twp.), sewerage permits, etc., 949,951,955
West Manchester Twp., water supply, 932
West Middlesex, sewerage permits, etc., 949,952
West Middletown, status of Board of Health, 229
West Nanticoke, (Plymouth Twp.), water supply, 1112
West Newton, sewerage permits, etc., 910,949,951,952
West Pikeland Twp., (cf. Chester Springs' Soldiers' Orphans), sewerage permits, 949
West Pittsburgh, water supply, 914,932
West Pittsburgh Realty Co., (cf. Taylor Twp.), sewerage permits, etc., 910,949,951,952,955
West Pittsburgh Water Co., water works (permits, sources, plant, etc.), 912,932,936,939,992
West Pittsgrove Twp., water supply, 932
West Pittston, births, 766,791,817,843,861
  mortality, 653
  water supply, 1086,1091
  notified to enforce sanitary regulations, 1220
West Pittston Water Co., 1086
West Reading, water supply, 914,998,1001
West Reading Water Co., purification plant and operation, 993,998,1001
West Reynoldsville, sewerage permits, etc., 949,952
West Salem Water Supply Co., water works (permits, sources), 932,937
West Side Water Co., (W. Pittston), 1086,1087
West Whiteland Twp., water supply, 932
West Wyoming, water supply, 1087,1091
  notified to enforce health regulations, 1220

Page.

- Western Pennsylvania Health Conference, address before the, .. 59
- Western Pennsylvania Hospital for the Insane, Dixmont, Allegheny Co., sewage disposal plant (permits, etc.), ...916,944,951,1005
- Westfield, (Mass.), State sanatorium inspected, ... 253,255
- Westmont, water supply, ... 932
- Westmoreland County, County Medical Inspector, ... 7
  - Township Health Officers, ... 16
  - abstract of reports of C. M. I., investigation of communicable diseases and regulation of dairies because of them, ... 197,203
  - summary of reports of Health Officers, ... 204
  - report of dairy inspections, ...209,211,213
  - notes on Boards of Health, ... 230
  - tuberculosis dispensaries, ... 27
  - tuberculosis mortality rates for five years, 620
  - poliomyelitis, ... 282,294
  - marriages, ... 886
  - rate (1906-1910), ... 888
  - rural births, ...773,799,825,851,865
  - rural mortality, ...655,696,707,713,742
- Westmoreland Water Co., of Hempfield Twp., water works (permit, sources), ... 932,936
- Westview, water supply, ... 932
  - sewerage permits, etc., ...911,949,951,952
- Whitcomb, Dr. H. H., C. M. I. for Montgomery Co., ... 7
  - abstract of report, ... 167
  - dispensary physician, ... 25
- White Haven, sewerage permits, etc., ... 949,952
- White Haven Sanatorium, (cf. Free Hospital, etc.).
- Whitemarsh Twp., water supply, ... 932
- White swelling, as a cause of death, ...613,658,676,715,724
- Whitfield, Dr. F. K., dispensary physician, ... 22
- Whooping Cough, funeral restrictions in cases of, ... 44
  - in certain counties, ..85,86,87,95,104,115,124,125,138, 155,165,172,173,185,200
  - in rural school children, ... 45,72
  - cases examined by County Medical Inspectors on report of Health Officers, ... 67
  - summary of inspections of County Medical Inspectors by counties, ... 201
  - morbidity, ... 869,873
  - mortality, ...612,656,674,702,714,723,743,747,750
  - (in children under two, by days, weeks, months), ...624,630,636,642
- Wickboro, water supply, ...932,996,1000
  - sewerage permits, etc., ... 949,955
- Wickersham, H. W., water works (permit, sources), ... 933,937
- Wiconisco, epidemics of scarlet fever, etc., and special reports thereon, ...53,259,266,319
- Widal reaction, examinations in the laboratories, and a new outfit therefor, ... 438
- Widowed persons married in 1910, ... 889
- Wilkes-Barre, tuberculosis dispensary, ... 25
  - births, ...767,791,817,843,861
  - mortality, ...653,694,699,705,710,714,740
  - tuberculosis mortality rates, ... 619
  - typhoid death rate, ... 606
  - typhoid fever, ... 1115
  - typhoid fever (1902-1910), ... 1085
  - sanitary committee acts as Board of Health, ... 227
  - (and vicinity), engineering report of the outbreak of typhoid fever, ... 1085
  - water supplies, (cf. Springbrook W. S. Co.), .. 914,998 1001,1087,1091,1096,1107
- Wilkes-Barre Twp., water supply, ... 1087
  - typhoid fever, ...1115,1212
  - notified to enforce health regulations, ... 1220

Page.

- Wilkes-Barre Water Co., 1087
- Wilkes-Barre Mountain, (cf. Little W.-B. Mountain), as a source of water, 1096
  - relation to the Wyoming Valley epidemic, 1115,1128
- Wilkins Twp., water supply, 933
  - sewerage permits, (cf. E. Wilkinsburg Improvement Co.), 949
- Wilkinsburg, tuberculosis dispensary, 22
  - births, 767,791,817,843,861
  - mortality, 653,694,699,705,710,740
  - tuberculosis, 616,619
  - typhoid death rate, 606
  - water supply, (cf. Penna. Water Co.), 933,998,1001
  - sewerage permits, etc., 949,951,955
- Williams, Dr. J., dispensary physician, 25
- Williams, James S., water works (permit, sources), 933,934
- Williams, Dr. T. L., dispensary physician, 25
- Williams, Dr. W. T., dispensary physician, 25
- Williams Twp., special medical report on typhoid fever, 330
- Williamson Free School of mechanical trades, (cf. Middletown Twp.), sewage disposal plant (permits, etc.), 916,949,951,1005,1006
- Williamsport, tuberculosis dispensary, 25
  - births, 767,791,817,843,861
  - mortality, 653,694,699,705,710,723,740
  - tuberculosis, 619
  - typhoid death rate, 606
  - water supply, (cf. Citizens Water and Gas Co.), 933
  - sewerage permits, etc., 911,949,955
- Williamsport Water Co., water works (permit, sources), 933,937
- Williamstown, (Dauphin), report of an inspection concerning measles, 245
- Willis, Dr. T. E., dispensary physician, 25
- Willistown Twp., water supply, 933
- Willow Grove Park, (cf. Parkside Hotel), sewage disposal plant, 916,1005
- Wilmerding, births, 767,791,817,843,861
  - mortality, 653
  - water supply, 933
- Wilson, Dr. J. G., dispensary physician, 26
- Windber, births, 767,791,817,843,861
  - mortality, 653
  - water supply, 933
- Windber Water and Power Co., water works (permit, sources), 933,936
- Winton, births, 767,791,817,843,861
  - mortality, 653
  - sewerage permits, etc., 949,951,955
- Wood, Dr. C. B., C. M. I. for Washington Co., 7
  - abstract of report, 191
  - dispensary physician, 27
  - special reports, 1077,1287
- Wood, Dr. J. W., dispensary physician, 23
- Woodburn, Dr. S. M., C. M. I. for Bradford Co., 7
  - abstract of report, 101
  - dispensary physician, 22
- Woodbury, (Beaver), status of the Board of Health, 222
- Woodland, special medical report concerning the epidemic of typhoid fever, 321
  - nurse's report, 329
  - special report of the engineering division, 1321
  - typhoid morbidity (1907-1910), by months, 1326
- Woodlawn, water supply, 933
- Woodside, smallpox, 243
- Woodward Twp., water supply, 933
- Wormleysburg, water supply, 933
- Worth Twp., (Centre), water supply, 933

Page.
Wounds, tables concerning the use of antitoxin, ... 598,600
Wright, Dr. J. W., C. M. I. for Erie Co., ... 7
 abstract of report, ... 138
 dispensary physician, ... 24
Wrightsville, water supply, ... 933
Wrightsville Water Supply Co., water works (permit, sources), .. 933,937
Wyalusing, (Bradford), status of Board of Health, ... 222
 water supply, ... 933
Wyalusing Water Co., water works (permit, sources), ... 933,936
Wyckoff, Dr. S. D., dispensary physician, ... 25
Wyoming County, County Medical Inspector, ... 7
 Township Health Officers, ... 16
 abstract of reports of C. M. I., investigation of communicable diseases and regulation of dairies because of them, ... 199,203
 summary of reports of Health Officers, ... 204
 reports of dairy inspections, ... 209,211,213
 notes on Boards of Health, ... 230
 tuberculosis dispensary, ... 27
 tuberculosis mortality rates for five years, ... 620
 poliomyelitis, ... 294
 marriages, ... 886
 rate (1906-1910), ... 888
 rural births, ... 773,799,825,851,865
 rural mortality, ... 655,696,707,713,742
 typhoid fever morbidity by months, also urban and rural, ... 1220-1222
Wyoming, water supply, ... 1087,1091
 typhoid fever, ... 1115,1212
 notified to enforce health regulations, ... 1220
 sewerage permits, etc., ... 949,951,955
Wyoming Water Co., ... 1087
Wyoming Valley, engineering report on the outbreak of typhoid fever, ... 1080

Yates, no Board of Health, ... 227
Yatesville, water supply, ... 1086
 notified to enforce health regulations, ... 1220
Yatesville Borough Water Co., ... 1086
Yeadon, water supply, ... 933
 sewerage permits, etc., ... 949,951,952,955
Yellow fever, ... 657,869
Yocum, Dr. C. A., dispensary physician, ... 23
Yoe Water Co., (permit, sources), ... 933,937
York, County, County Medical Inspector, ... 7
 Township Health Officers, ... 16,17
 abstracts of reports of C. M. I., investigation of communicable diseases and regulation of dairies because of them, ... 200,203
 summary of reports of Health Officers, ... 204
 report of dairy inspections, ... 209,211,213
 notes on Boards of Health, ... 230
 tuberculosis dispensaries, ... 27
 tuberculosis mortality rates for five years, ... 620
 poliomyelitis, ... 294
 marriages, ... 886
 rate (1906-1910), ... 888
 rural births, ... 773,799,825,851,865
 rural mortality, ... 655,696,707,713,742
York, tuberculosis dispensary, ... 27
 births, ... 767,791,817,843,861
 mortality, ... 653,694,699,705,710,723,740
 typhoid death rate, ... 606
 tuberculosis mortality rates for five years, ... 619
 water supply, ... 914,933,991,998,1001,1293
 sewerage permits, etc., ... 949,951,952

Page.

York Water Co., water works (permits, sources, plant, etc.), .. 909,912 933,936,939,993,998,1001,1293

Yorkville, (Pottsville), sewerage permit, etc., ... 947,952

Yough Valley Medical Society, address by Dr. Royer, ... 241

Youghiogheny River and its sanitary condition, ... 1332

Youngman, Dr. C. W., C. M. I. for Lycoming Co., ... 7
  abstract of report, ... 161
  dispensary physician, ... 25
  special report on the employment of the tubercle bacilli products, ... 433

Youngsville, sewerage permits, etc., ... 949,955

Youngwood, water supply, ... 933
  sewerage permits, etc., ... 949,955

Zelienople, sewerage permits, etc., ... 949,952

Zerbe Twp., water supply, ... 933
  sewerage permits (cf. Trevorton Sewerage Co.), ... 949

Zierdon, W. E., water works (permits, sources), ... 933,935

Zulick, Dr. T. C., dispensary physician, ... 25

COLUMBIA UNIVERSITY LIBRARIES

This book is due on the date indicated below, or at the expiration of a definite period after the date of borrowing, as provided by the library rules or by special arrangement with the Librarian in charge.

DATE BORROWED	DATE DUE	DATE BORROWED	DATE DUE
C28 (747) M100			